جـــــــــامـــعة بنـــهـا

كـــــلية الهندســـــــة ببنـــــــها

برنامج الهندســـة المدنيـــة

المجلس الأعلى للجامعات
الإدارة المركزية لشئون تطوير التعليم الجامعي
إدارة لجان قطاعات العلوم الأساسية

السيد الأستاذ الدكتور/ جمال عبد الرحيم سوسه
رئيس جامعة بنهـــا

تحية طيبة وبعد،،،

أتشرف بأن أرسل لسيادتكم رفق هذا صورة من القرار الوزاري رقم (٧٩٧) بتاريخ ٢٠٢٣/٥/٨ بشأن بدء الدراسة ببرنامج درجة البكالوريوس في تخصص (هندسة الميكاترونيات والاتمتة) ضمن البرامج الدراسية متعددة التخصصات وإصدار اللائحة الداخلية المتكاملة لمرحلة البكالوريوس (البرامج التخصصية – البرامج متعددة التخصصات) بنظام الساعات المعتمدة لكلية الهندسة ببنها بجامعتكم الموقرة، وعلى النحو المبين بالقرار المرفق.

برجاء التفضل بالنظر والتكرم باتخاذ ما ترونه سيادتكم مناسباً في هذا الشأن.

وتفضلوا بقبول فائق التقدير والاحترام،،

أمين المجلس الأعلى للجامعات

٢٠٢٣/٥/١٤

(أ.د/مصطفى رفعت)

+٢٨٥ المرفقات
٥/١٤

صورة مبلغة إلى:
السيد الأستاذ الدكتور/ السيد على إبراهيم حسن
عميد كلية الهندسة ببنها جامعة بنها

تم التحرير فى ٢٠٢٣/٠٥/١٣

Cairo University Campus Giza, Egypt
URL:www.scu.eun.eg
e-mail:scu@scu.eg

المجلس الأعلى للجامعات – مقر جامعة القاهرة
(الحرم الجامعي)، الجيزة، مصر، بريد ١٢٦١٣
فاكس: ٣٥٧٢٨٨٧٧ - ٣٥٧٢٨٧٢٢
تليفون: ٣٥٧٠٤١٥٨ - ٣٥٧٠٤١٩٤

كلية الهندسة ببنـها ـ جامعة بنـها
اللائحة الموحدة لبرامج البكالوريوس بنظام الساعات المعتمدة


وقل
رب زدني علما

المحتوى	رقم الصفحة
أولا: مقدمة	1
الرؤية والرسالة وأوجه التميز	1
الرؤية	1
الرسالة	1
أوجه التميز في هذه الخطة	2
تطور إنشاء الكلية وأقسامها العلمية	2
النظرة المستقبلية	3
الأهداف الأستراتيجية للكلية	3
ثانيا: الأحكام العامة و الإنتقالية و مواد اللائحة	4
مادة (1) أحكام عامة	4
مادة (2) أحكام إنتقالية	4
مادة (3) منح الدرجات العلمية	5
مادة(4) الأقسام العلمية	6
ثالثا: لائحة الدراسة بنظام الساعات المعتمدة	8
مادة(5) نظام الدراسة بالبرامج الأكاديمية	8
مادة (6) معيار الساعة المعتمدة طبقا للإطار المرجعى (2020)	8
مادة(7) رئيس القسم العلمي	8
مادة (8) منسق البرنامج	9
مادة (9) لجنة شئون التعليم والطلاب	10
مادة (10) المنسق العام للتحول الرقمى بالبرامج	11
مادة (11) مجلس إدارة البرامج	11
مادة (12) إجراءات إضافة / تجميد البرامج	12
مادة (13) شروط القيد ومتطلبات الإلتحاق	12
مادة (15) قواعد التحويل (تغيير البرنامج الدراسى) وإعادة القيد داخل الجامعة	14
مادة (16) قواعد التحويل من الجامعات الأخرى	14
مادة (17) الدراسة فى جامعات اخرى	15
مادة (18) متطلبات الحصول على الدرجة	16
مادة (19) مدة الدراسة	17
مادة(20) مواعيد الدراسة	17
مادة (21) الأقسام العلمية المشتركة فى تنفيذ برامج الساعات المعتمدة	18
مادة (22) طرق التدريس والوسائل التعليمية	18
مادة (23) قواعد الإنتظام فى الدراسة	19
مادة (24) الفصل من الدراسة والإنذار الأكاديمى	19
مادة (25) شروط تسجيل المقررات الدراسية	20
مادة (26) مستويات الدراسة	21
مادة (27): التدريب الميداني	21
مادة(28) إضافة وحذف المقررات الدراسية	21
مادة(29) الإنسحاب من المقررات الدراسية	21
مادة(30) المقررات الدراسية الغير مكتملة	22
مادة(31) إعادة المقررات الدراسية	22
مادة(32) الإمتحانات والتقييم للمقررات الدراسية	23
مادة(33) تقديرات المقررات الدراسية	24
مادة (34) المرشد الأكاديمى	24

مادة (35) حساب المعدل التراكمى (GPA)	25
مادة (36) مرتبة الشرف لطلبة البكالوريوس	25
مادة (37) تكليف خريجى البرامج فى وظيفة معيد	25
مادة (38) الإدارة الإلكترونية	26
رابعا: تفاصيل البرامج المقدمة	27
ملخص البرامج الدراسية	29
متطلبات االجامعة	30
متطلبات الكلية Faculty Requirements for Displinary Programs	36
Program # 9 Architectural Engineering Program	45

أولا: مقدمة

لقد بدأ التعليم الهندسى فى نهاية القرن التاسع عشر كإحدى الركائز المطلوبة للاستفادة من ثورة الاكتشافات العلمية التى صاحبت الثورة الصناعية. ومع التطور الذى حدث فى نهاية القرن التاسع عشر وبداية القرن العشرين وُضعت مهمتان رئيسيتان هما مهمة العلم والعالم ومهمة الهندسة والمهندس ، حيث تسعى الأولى إلى توسيع إطار المعرفة فى المجالات التى تفيد البشرية، فى حين تسعى المهمة الثانية إلى الاستفادة من المعرفة العلمية في ما ينفع الإنسان والمجتمع من خلال تطوير منتجات جديدة أو فتح مجالات جديدة تلبي احتياجات الإنسان والمجتمع.
ومن الواضح أن التعليم الهندسى يهدف إلى توفير الكوادر القادرة على الاستفادة من التقدم العلمى فى استنباط منتجات جديدة تلبي متطلبات المجتمع، إلا أن استفادة المجتمع من تلك المنتجات الجديدة لا تتحقق إلا بتصنيعها، الأمر الذي يتطلب توفير الطاقات الإنتاجية المناسبة وإعداد المستندات الفنية والهندسية وتوفير العدد والآلات ومعدات القياس وتخطيط ومتابعة الإنتاج ومراقبة الجودة والعناية بالصيانة وتصنيع قطع الغيار وغيرها من العناصر الإنتاجية.

إن احتياج سوق العمل لكوادر بشرية مدربة ومؤهلة للعمل في المجالات الهندسية المختلفة يتطلب إعداد مهندس على معرفة كافية بالعلوم الهندسية الحديثة إلى جانب القدرة على التطبيق والمزج بين فروع المعرفة المختلفة.

لقد أوضحت هذه الرؤية منذ سنوات عديدة لدى الدول المتقدمة والرائدة فى المجالات الصناعية والهندسية، وبعض دول العالم الثالث كفاءتها، وكان من أهم أثار ذلك ما نراه ونلمسه واضحا من تقدم علمى وصناعى وتكنولوجى جعل هذه الدول رائدة فى تلك المجالات.

إن مواكبة التقدم العلمي والتكنولوجي المتنامي يتطلب التطوير المستمر لبرامج التعليم الهندسي اللازمة لإعداد أجيال من المهندسين تساهم في التطوير والدعم الهندسي المطلوب للقطاعات الصناعية والمدنية وخدمة المجتمع.

الرؤية والرسالة وأوجه التميز

أ. الرؤية

تتطلع الكلية لتحقيق مكانة متميزة على المستوى القومي و الإقليمي و الدولي في التعليم الهندسي و البحث العلمي و الابتكار لتحقيق التنمية المستدامة للمجتمع.

ب. الرسالة

تلتزم الكلية بإعداد كوادر هندسية مزودة بالمعارف والمهارات اللازمة للمنافسة فى سوق العمل ، وقادرة على استخدام وتطوير التكنولوجيا الحديثة، وتقديم بحوث فى المجالات الهندسية بما يخدم المجتمع والبيئة.

ت. أوجه التميز في هذه الخطة

تتوجه الخطة الجديدة إلى التأكيد على أهمية الربط بين التعليم و التعلم، كذلك تعتمد على إدخال تكنولوجيات حديثة في أساليب التعليم مثل التعليم الإلكتروني و التعليم عن بعد بالإضافة إلى التوجه للتعليم المتكامل و ذلك من خلال:

1 ـ برامج دراسية حديثة تتوافق مع احتياجات سوق العمل.

2 ـ محتوى علمى يركز على الجوانب الهندسية والتطبيقية.

3 ـ برامج للتدريب الميدانى تصقل مهارات الطالب وتؤهله لمواكبة سوق العمل.

4 ـ التركيز على استخدام تطبيقات الحاسب الآلى فى الهندسة.

5 ـ إثراء الطالب باللغة الأجنبية الفنية.

6 ـ حزمة من المواد الاختيارية تحقق طموح الطلاب فى برامج دراسية مرنة.

تطور إنشاء الكلية وأقسامها العلمية

أُنشئت كلية هندسة بنها عام 1988م تحت مسمى المعهد العالى للتكنولوجيا ببنها التابع لوزارة التعليم العالى وكانت مدة الدراسة به خمس سنوات للحصول على درجة البكالوريوس في الهندسة. وفى عام 1993 م بدأت برامج الدراسات العليا في الكلية ببرنامجين لنيل درجة الماجستير والدبلوم. وانضم المعهد العالى للتكنولوجيا ببنها تحت مظلة جامعة بنها عام 2006 م، وتم تغيير مسمى المعهد العالى للتكنولوجيا ببنها إلى كلية الهندسة ببنها عام 2011 م. ومنذ بدايتها سارت الكلية على طريق النمو الكمي والتطور النوعي، ففي عام 2012 تم اعتماد وتطبيق اللائحة الجديدة لكلية الهندسة ببنها. وفى عام 2013 تم اعتماد وتطبيق اللائحة الجديدة للدراسات العليا لتشمل برنامجاً لنيل درجة الدكتوراه بالإضافة إلي برنامجي الماجستير و الدبلوم.

وتشهد الكلية زيادة مضطردة في أعداد طلابها وفي أعداد أعضاء هيئة التدريس فيها. ومنذ انشائها يتمتع خرجيها بمستوى فنى متميز وأكاديمي رفيع، كما أن إنتاجها العلمي والبحثي إنتاج متميز ومعروف على المستوى الدولي. وبدأت الكلية بثلاثة أقسام هي: الهندسة الميكانيكية و الهندسة الكهربائية والهندسة المدنية بالإضافة لقسم العلوم الهندسية الأساسية، ثم سعت ادارة الكلية مؤخرا لإنشاء قسم الهندسة المعمارية لسد عجز المجتمع المحيط بالكلية لهذا التخصص، وقد تم تحديث لائحة الكلية عام 2016 لتشمل قسم الهندسة المعمارية، وتم اعتمادها من لجنة قطاع الدراسات الهندسية والمجلس الأعلى للجامعات في نوفمبر 2016.

تضم الكلية العديد من المعامل والمختبرات المزودة بأحدث التقنيات والتجهيزات الحديثة التي تساعد الطالب والباحث في إجراء البحوث والدراسات. وتسعى الكلية ببذل كل جهد لخدمة المجتمع ومهنة الهندسة من خلال

تقديم برامج متخصصة متميزة وتقديم الاستشارات الهندسية للقطاع الخاص والحكومي وتقديم الدورات التدريبية وورش العمل المتخصصة وكذلك عقد المؤتمرات والمشاركة في الملتقيات العلمية محليا ودوليا.

وتضم الكلية الأقسام العلمية التالية :

1. قسم الهندسة الميكانيكية.
2. قسم الهندسة الكهربية.
3. قسم الهندسة المدنية.
4. قسم العلوم الهندسية الأساسية.
5. قسم الهندسة المعمارية .

النظرة المستقبلية

كانت كلية الهندسة ببنها - جامعة بنها دائما سبّاقة في إنشاء التخصصات الجديدة والتي يحتاجها المجتمع المحلى والإقليمي والدولي مثل شعبة الهندسة الطبية وشعبة هندسة الميكاترونيات، ومع التقدم الصناعي في المجالات المختلفة على المستوى المحلي والمستوى الإقليمي والدولي بالإضافة إلى النهضة التى تشهدها مصر للمشاريع القومية فلقد برزت الحاجة إلى إنشاء عدد من البرامج متعددة التخصصات (Inter-Disciplinary Programs) لمنح درجة بكالوريوس العلوم في الهندسة في التخصصات التالية :

- الهندسة الكهروميكانيكية.
- هندسة وإدارة التشييد.
- هندسة المرافق والبنية التحتية
- هندسة الميكاترونيات و الأتمتة

الأهداف الأستراتيجية للكلية

- تخريج مهندسين على معرفة بالأساليب الهندسية الحديثة.
- إعداد الكوادر القادرة على إيجاد حلول للمشاكل الهندسية واتخاذ القرارات.
- إعداد مهندسين قادرين على المنافسة في سوق العمل.
- تنمية القيم الأخلاقية والتربوية للخريجين بخلق مناخ تعليمي وتربوي متكامل.
- الإسهام في التطوير والدعم الهندسي اللازم للقطاعات الصناعية والخدمية وخدمة المجتمع.
- توفير دراسات عليا تتسم بمزج العلوم الهندسية بالتجريب والتطبيق لتنمية الفكر الابتكاري المتطور واللازم لتطور المجتمع.

- توفير دورات تعليم وتدريب مستمر تهدف إلى تطوير أداء المهندسين في المجالات الحديثة وغير التقليدية.
- استخدام إمكانيات الكلية بما يخدم المجتمع المحيط ويوفر فرصة لتدريب الطلاب.
- العمل كمركز للبحوث ودراسات الجدوى لحل المشاكل المرتبطة بالصناعة والإنتاج في البيئة المحيطة وتقديم الاستشارات الهندسية للمنشآت ولمشروعات البنية الأساسية بكافة أنواعها.

ثانيا: الأحكام العامة و الانتقالية و مواد اللائحة

مادة (1) أحكام عامة

1. تطبق أحكام قانون تنظيم الجامعات ولائحته التنفيذية واللائحة الداخلية للكلية وغيرها من اللوائح الجامعية فيما لم يرد فى شأنه نص فى هذه اللائحة
2. يخضع الطالب لقانون تنظيم الجامعات ولائحته التنفيذية و القواعد المنظمة الصادرة من الجامعة . أما مالم يذكر فيه نص فتطبق عليه أحكام هذه اللائحة.
3. يسمح للكلية بإضافة مقررات لقائمة المقررات الاختيارية وذلك بموافقة مجلس القسم العلمي ومجلسي الكلية والجامعة دون الرجوع للجنة القطاع الهندسى.
4. لمجلس الكلية بعد موافقة مجلس القسم العلمي المختص، الموافقة على تغيير جزئي للمحتوى العلمى للمقرر بما لايتعارض مع اسم المقرر وأهدافه بنسبة لاتتعدى 20%.

مادة (2) أحكام إنتقالية

1- تعقد المحاضرات لعدد لا يزيد عن مائة وعشرين طالبا ويلقيها أحد الأساتذة أو الأساتذة المساعدين أو المدرسين، وعلى القائم بالتدريس الإشراف على التمارين والتمارين التطبيقية وتحتسب ساعات إشراف بواقع عدد ساعات التمرين و التمرين التطبيقي المحددة للمقرر.

2- يقوم بتدريس التمارين عضو من هيئة التدريس وأحد معاونيه أو اثنان من معاونى أعضاء هيئة التدريس لكل مجموعة مكونة من 20 طالبا.

3- تعامل التمارين التطبيقية تعامل معاملة التمارين ويقوم بتدريس المواد التطبيقية للمجموعة المكونة من 10 طلاب عضو هيئة تدريس وأحد معاونيه أو اثنان من معاونى أعضاء هيئة التدريس بالإضافة إلى اثنين من القائمين بالتدريب العملى بالورش أو المعامل.

4- بالنسبة للتدريب الميدانى يتم فى المراكز الصناعية والشركات الهندسية ويشرف على التدريب عضو هيئة تدريس واحد وأحد معاونيه ويعاون فى تنظيم التدريب إدارى واحد من الكلية لما لايقل عن 5 طلاب في المجموعة الواحدة ، بالإضافة إلى مهندس من المصنع لكل خمسة طلاب على أن تصرف لكل منهم مكافأة بواقع 5 % من أساس المرتب عن كل يوم تدريب.

مادة (3) منح الدرجات العلمية

تقدم كلية الهندسة ببنها مجموعة من البرامج الهندسية. ويدير البرنامج مجلس إدارة للبرنامج. تنقسم البرامج إلى برامج تخصصية والبرامج متعددة التخصصات (Inter-Disciplinary Programs). يتم اختيارهم بعناية لتلبية احتياجات المجتمع والصناعة وكذلك الاحتياجات الإقليمية التي تستقطب العديد من الخريجين المصريين.

جدول (1) قائمة البرامج التي تقدمها كلية الهندسة ببنها – جامعة بنها

البرامج الهندسية	البرامج التخصصية	الهندسة الميكانيكية	1	هندسة التصميم والإنتاج الميكانيكي Mechanical Design and Production Engineering Program
			2	هندسة القوي الميكانيكية Mechanical Power Engineering Program
			3	هندسة الميكاترونيات Mechatronics Engineering Program
		الهندسة الكهربية	4	هندسة الإلكترونيات والاتصالات الكهربية Electronics and Electrical Communications Engineering Program
			5	الهندسة الطبية الحيوية Biomedical Engineering Program
			6	هندسة القوي والآلات الكهربية Electrical Power and Machines Engineering Program
			7	هندسة الحاسبات ونظم التحكم Computer and Control Systems Engineering Program
		الهندسة المدنية	8	الهندسة المدنية Civil Engineering Program
		الهندسة المعمارية	9	الهندسة المعمارية Architectural Engineering Program
	البرامج متعددة التخصصات (Inter-Disciplinary Programs)	الهندسة الكهروميكانيكية	10	Elctromechanical Engineering Program
		هندسة و إدارة التشييد	11	Construction Engineering and management Program
		هندسة المرافق و البنية التحتية	12	Infrastructure and Utilities Program
		هندسة الميكاترونيات و الأتمتة	13	Mechatronics Engineering and Automation Program

تمنح جامعة بنها بناء على طلب من مجلس كلية الهندسة ببنها درجة البكالوريوس فى التخصصات التالية :

1- بكالوريوس العلوم في الهندسة الميكانيكية

- برنامج هندسة التصميم والإنتاج الميكانيكي.
- برنامج هندسة القوي الميكانيكية.
- برنامج هندسة الميكاترونيات.
- برنامج الهندسة الكهروميكانيكية
- برنامج هندسة الميكاترونيات و الأتمتة

2- بكالوريوس العلوم في الهندسة الكهربية

- برنامج هندسة الإلكترونيات والاتصالات الكهربية.
- برنامج الهندسة الطبية الحيوية.
- برنامج هندسة القوي والآلات الكهربية.
- برنامج هندسة الحاسبات ونظم التحكم.

3- بكالوريوس العلوم في الهندسة المدنية

- برنامج الهندسة المدنية.
- برنامج هندسة و إدارة التشييد
- برنامج هندسة المرافق و البنية التحتية

4- بكالوريوس العلوم في الهندسة المعمارية

- برنامج الهندسة المعمارية.

ويشترط على الطالب إتمام المتطلبات الأكاديمية اللازمة لأحد تلك البرامج للحصول على الدرجة العلمية فى التخصص المطلوب وتكون الدراسة فى هذه البرامج بنظام الساعات المعتمدة وباللغة الإنجليزية.

مادة(4) الأقسام العلمية

تقدم المقررات في كلية الهندسة ببنها من خلال خمسة أقسام علمية جدول (2).

جدول (2) الأقسام العلمية – كلية الهندسة ببنها – جامعة بنها

م	القسم العلمي
1	قسم العلوم الهندسية الأساسية
2	قسم الهندسة الميكانيكية
3	قسم الهندسة الكهربية
4	قسم الهندسة المدنية
5	قسم الهندسة المعمارية

تقع مسؤولية القسم العلمي كالتالي:

- تدريس المقررات لجميع البرامج والتي تحتاج إلى مقررات في تخصص القسم و كذلك البحث العلمي.
- القسم العلمي هو المسؤول عن تدريس المحتوى العلمي للمقرر وترشيح أعضاء هيئة التدريس لكل مقرر سواء من القسم أو من قسم آخر أو من خارج الكلية.
- إقتراح انتداب أعضاء هيئة التدريس من خارج الكلية خاضع لموافقة مجلس الكلية إذا دعت الحاجة.
- القسم هو المسؤول عن التطوير المستمر لمناهج التدريس والمحتوى العلمي للمقررات.

الموضوعات التالية خاصة بالقسم العلمي المختص بالتدريس وإجراء البحوث فيها على النحو التالي:

1. قسم العلوم الهندسية الأساسية: الرياضيات والفيزياء والميكانيكا والكيمياء.
2. قسم الهندسة الميكانيكية:

- تخصص هندسة التصميم والإنتاج: تكنولوجيا السباكة واللحام، هندسة صناعية، هندسة مواد، ميكانيكا القياسات، ميكانيكا الآلات والتحكم الآلي، التصميم والرسم الهندسي، قطع المعادن، تشكيل المعادن، التصنيع الرقمي، تخطيط المصانع، هندسة الجودة.
- تخصص هندسة القوى الميكانيكية: الديناميكا الحرارية وديناميكا الغازات، انتقال الحرارة والكتلة، ميكانيكا الموائع، الاحتراق، أنظمة الطاقة الحرارية ومحركات الاحتراق الداخلي والتكييف والتبريد، التحكم الآلي والقياسات للنظم الحرارية، أنظمة الطاقة الجديدة و المتجددة.
- تخصص الميكاترونيات: الأتمتة والتحكم، التصميم المدمج، تصميم وتصنيع الميكاترونكس، الروبوتات وتطبيقات الميكاترونكس، الأنظمة الميكاترونية في الصناعة، الأنظمة الميكاترونية في السيارات.

3. قسم الهندسة الكهربية:

- تخصص هندسة القوى والآلات الكهربائية: أساسيات الهندسة الكهربائية، الآلات الكهربائية، أنظمة القوى الكهربائية، الجهد العالي، إلكترونيات القوى، هندسة القطع و الحماية ، القياسات الكهربائية والاختبار والتحكم في أنظمة الطاقة.
- تخصص هندسة الإلكترونيات والاتصالات الكهربائية: المواد الكهربائية، القياسات الإلكترونية، الهندسة الإلكترونية، الدوائر الإلكترونية، الاتصالات، الموجات الكهرومغناطيسية، الاختبارات الكهربائية، الدوائر المتكاملة.
- تخصص هندسة الحاسبات والنظم: هندسة البرمجيات ، شبكات الحاسوب، الأمن الرقمي، تنظيم الحاسوب، الرقمية، تصميم الدوائر والأنظمة المدمجة والذكاء الاصطناعي والتطبيقات والوسائط المتعددة، المعالجة وهندسة النظم وتطبيقات الكمبيوتر.

4. قسم الهندسة المدنية: التحليل الإنشائي، تصميم الهياكل الخرسانية، تصميم الهياكل الفولاذية، اختبار الخصائص وقوة المواد وضبط الجودة، والهندسة الجيوتقنية والأساسات، و هندسة التشييد وإدارة المشاريع، ميكانيكا الموائع، الهيدروليكا، المساحة والجيوديسيا، هندسة الري و الصرف، المسح التصويري والاستشعار عن بعد ، هندسة النقل المرور ، الصرف الصحي، الهندسة البيئية ، تخطيط النقل ، الطرق والمطارات.

5. قسم الهندسة المعمارية: التصميم المعماري، نظرية العمارة، تاريخ العمارة، تطبيقات الحاسب في الهندسة المعمارية والرسومات التنفيذية وتكنولوجيا البناء والتشريعات وإدارة المشاريع، الحفاظ على المباني وترميم التراث المعماري، التصميم الحضري ، التخطيط الحضري ، تخطيط المدن، الدراسات البيئية، وإعادة تأهيل المواقع التاريخية والتراثية.

ثالثا: لائحة الدراسة بنظام الساعات المعتمدة

مادة(5) نظام الدراسة بالبرامج الأكاديمية

يطبق نظام الساعات المعتمدة فى جميع المقررات الدراسية بالبرامج الأكاديمية وفقاً للقواعد التنفيذية للدراسة و التي يقرّها مجلس الجامعة ولجنة قطاع الدراسات الهندسية والتكنولوجية والصناعية بالمجلس الأعلى للجامعات.

مادة (6) معيار الساعة المعتمدة طبقا للإطار المرجعى (2020)

أولا: بالنسبة للمحاضرات: تحسب ساعة معتمدة واحدة لكل محاضرة مدتها ساعة واحدة أسبوعيا خلال الفصل الدراسى الواحد.

ثانيا : بالنسبة للتمارين التطبيقية والدروس العملية: تحسب ساعة معتمدة واحدة لكل 2-3 ساعة اتصال إسبوعيا خلال الفصل الدراسى الواحد.

ثالثاً : تنقسم ساعة الاتصال الواحدة إلي 50 دقيقة تدريس فعلي و10 دقائق راحة.

مادة(7) رئيس القسم العلمى

يقوم رئيس القسم العلمى بالمهام التالية:

1- تحقيق الأهداف والسياسات العليا في الكلية.
2- الإشراف على إدارة شؤون القسم التعليمية والبحثية والإدارية.
3- تنسيق مع رؤساء الأقسام العلمية الأخرى فى ترشيح السادة أعضاء هيئة التدريس للقيام بأعباء تدريس المقررات كل في مجال تخصصه.
4- .إعداد الخطط التشغيلية للقسم ومتابعة تنفيذها.
5- الإشراف على عملية التطوير الأكاديمي للبرامج بالقسم.
6- الإشراف على التدريب الميدانى.
7- الإشراف على المؤتمر العلمى للبرنامج.
8- الإشراف على تطوير البنية التحتية من مدرجات وقاعات ومعامل.
9- الإشراف على أعمال الجودة بالبرامج.

10- الإشراف على عملية معادلة المقررات الدراسية في القسم.

11- إعداد تقرير سنوي شامل عن سير الدراسة والأداء الأكاديمي والإداري والبحثي في القسم ورفعه إلى عميد الكلية.

مادة (8) منسق البرنامج

يتم اختيار منسق لكل برنامج بقرار من مجلس الكلية بناء على إقتراح من مجلس القسم العلمي المختص أو مجلسي القسمين بالنسبة للبرامج البينية لمدة عامين دراسيين قابلة للتجديد وفق المعايير التالية:

1- أن يكون أحد أعضاء هيئة التدريس العاملين بالقسم ذو كفاءة في مجال تخصصه.
2- أن يتمتع بمهارات القيادة والإدارة والقدرة علي العمل بمهارة مع الفريق.
3- أن يتمتع بمهارات الاتصال الفعال مع الزملاء، والقيادات الأكاديمية، والإدارية.
4- أن يكون لديه رؤية ويطرح حلول مبتكرة
5- أن يكون لديه خبرة في مجال جودة وتطوير التعليم.
6- أن يكون علي دراية بنماذج توصيف و تقارير البرامج والمقررات الدراسية.
7- أن يكون لديه خبرة في كيفية إجراء وصياغة دراسة التقييم الذاتي.
8- أن يشارك في الأنشطة الطلابية.
9- أن يكون لديه سيرة ذاتية تؤهله للتميز في إنجاز المهام المحددة، وسجل وتاريخ وظيفي يشهد له بالنزاهة والالتزام.

ويقوم منسق البرنامج بالمهام التالية :

1- متابعة تنفيذ البرنامج الدراسي من خلال:
   - التحقق من اكتساب الطلبة لمخرجات تعلم البرنامج الدراسي.
   - التحقق من تطبيق استراتيجيات التدريس الموصى بها في توصيف مقررات البرنامج الدراسي.
   - التحقق من تطبيق طرق تقييم الطلبة الموصى بها في توصيف مقررات البرنامج الدراسي.
   - متابعة تفسير النتائج غير الطبيعية لطلبة المقرر الدراسي مع مدرس المقرر.
2- دراسة الصعوبات التي تواجه تنفيذ البرنامج الدراسي، ورفع تقرير بذلك إلى رئيس القسم.
3- رفع المقترحات المتعلقة بتطوير المقررات الدراسية إلى رئيس القسم.
4- الإشراف على عمليات التسجيل الأكاديمى للطلاب و متابعة الخطة الدراسية للطلاب.
5- متابعة الإرشاد الأكاديمى للطلاب.

6- عرض معادلة المقررات للطلاب المحولين من برامج أخرى أو من كليات أخرى على رئيس القسم المختص.

7- متابعة العملية التعليمية ومراجعة التقارير الخاصة بالمقررات من السادة أعضاء هيئة التدريس لتحسين العملية التعليمية.

8- إعداد ومناقشة التقرير السنوي للبرنامج الدراسي مع أعضاء هيئة التدريس بالقسم، ورفع التقرير السنوي للبرنامج والتوصيات المتعلقة به إلى رئيس القسم.

9- عرض خطة المقررات في بداية كل فصل دراسي.

10- جمع البيانات الإحصائية المتعلقة بالبرنامج الدراسي، ورفع تقرير بذلك إلى رئيس القسم.

11- دراسة الاحتياجات التدريبية لأعضاء القسم، ورفع تقرير بذلك إلى رئيس القسم.

12- متابعة انتظام العملية التعليمية والجداول الدراسية.

13- .تطبيق نظم ولوائح الجودة والتقويم والاعتماد الأكاديمي .

14- المتابعة مع لجنة جودة البرنامج لعمل الدراسة الذاتية أو التقريرالسنوي للبرنامج.

مادة (9) لجنة شئون الطلاب

تشكل لجنة شئون التعليم و الطلاب برئاسة وكيل الكلية للتعليم و الطلاب و تختص لجنة شئون الطلاب بدراسة كل الشئون الخاصة بالطلاب طبقا للمادة (28) من قانون تنظيم الجامعات:

1- إبداء الرأي في قبول تحويل الطلاب و نقل ووقف القيد و قبول الأعذار.

2- تنظيم التدريب العملي للطلاب.

3- تتبع نتائج الامتحانات و دراسة الإحصاءات الخاصة بها، و تقارير لجان الامتحان عن مستوياتها، و تقديم التوصيات اللازمة في شأنها إلى مجلس الكلية.

4- تنظيم المكافأت و المنح الدراسية.

5- تتبع النشاط الثقافي و الرياضي و الاجتماعي للطلاب و تقديم الاقتراحات الكفيلة برفع مستواه.

6- تنظيم سياسة علمية للطلاب، بحيث يكون لكل مجموعة من طلاب الفرقة الدراسية رائد من أعضاء هيئة التدريس، يعاونه مدرس مساعد أو معيد للوقوف على مشاكلهم العلمية و توجيههم و العمل على حلها بمعرفة إدارة الكلية و أساتذتها.

يتم عرض جميع توصيات لجنة شئون التعليم والطلاب على مجلس الكلية للاعتماد. و يتم تصعيد الأمور المتعلقة بشؤون الطلاب على مستوى الجامعة في مسارين:

1. مجلس التعليم و الطلاب بجامعة بنها للطلبة الملتحقين بالبرامج التخصصية.
2. مجلس برامج جامعة بنها للطلاب المقيدين بالبرامج متعددة التخصصات.

مادة (10) المنسق العام للتحول الرقمي بالبرامج

يعين بقرار من السيد الأستاذ الدكتور عميد الكلية بعد ترشيح السيد الأستاذ الدكتور وكيل الكلية لشئون التعليم والطلاب بالكلية منسق عام للتحول الرقمى للبرامج من السادة أعضاء هيئة التدريس بالكلية من أصحاب الخبرات فى العمل بنظام الساعات المعتمدة لمدة عامين دراسيين قابلة للتجديد وعليه القيام بالمهام التالية:

1- الإشراف على تجهيز البنية التحتية للتحول الرقمى من شبكات و نقاط اتصال بشبكة الإنترنت.
2- مراجعة أعمال التسجيل للطلاب إلكترونيا.
3- مراجعة تصحيح الاختبارات الإلكترونية.
4- رفع نتائج الطلاب على المنصة الرقمية للجامعة.

مادة (11) مجلس إدارة البرامج

يقوم مجلس القسم العلمي المختص بدور مجلس الإدارة للبرامج التخصصية (المجانية)، أما البرامج متعددة التخصصات (غير المجانية) تشكل مجالس إدارتها طبقا للائحة الموحدة للبرامج بالجامعة. ويختص مجلس إدارة البرامج بالنظر في جميع الاجراءات العلمية والدراسية والإدارية والمالية المتعلقة بالبرامج متعددة التخصصات ، وبالأخص الإجراءات الآتية :

أ. التخطيط الاستراتيجي للبرامج.
ب. الأنشطة التسويقية للبرامج.
ت. إجراء دراسات الجدوى الخاصة بفتح وتجميد البرامج الأكاديمية.
ث. جميع المسائل المالية المتعلقة بتشغيل البرامج.
ج. دراسة الاستثناء من القواعد الواردة في لوائح وأنظمة الكلية.
ح. اقتراح السياسات للمحافظة على جودة التعليم والتعلم في البرامج.
د. مراجعة تقارير اللجان التوجيهية للبرامج وتقارير لجنة شئون التعليم والطلاب.
ذ. التعامل مع تظلمات الطلاب فيما يتعلق بمقررات معينة.
ر. أي مسائل أخرى تتعلق بتشغيل البرامج.

وترفع جميع توصيات مجلس إدارة البرامج إلى مجلس الكلية للاعتماد النهائي.

مادة (12) إجراءات إضافة / تجميد البرامج

- يمكن لأي قسم من أقسام الكلية اقتراح برنامج تخصصي جديد ضمن تخصص هذا القسم. كما يمكن أن يقترح أكثر من قسم برنامجًا جديدًا متعدد التخصصات.
- يجب تقديم مقترح البرنامج متضمنًا جميع معلومات البرنامج كما في هذه اللوائح بالإضافة إلى دراسة جدوى لاحتياجات الصناعة والمجتمع لخريجي البرنامج الجديد. ويجب أن يتضمن الاقتراح أيضًا مراجعة الموارد المتاحة داخل الكلية لتشغيل هذا البرنامج.
- يجب تقديم جميع المقترحات إلى مجلس إدارة البرامج الذي يقوم بدراسة الاقتراح ورفع التوصية إلى مجلس الكلية.
- بعد الموافقة عليها من قبل مجلس الكلية، يتم إحالتها إلى الجامعة لإحالتها إلى المجلس الأعلى للجامعات ومن ثم إضافتها إلى هذه اللوائح.
- يمكن لمجلس الكلية، بناءً على توصية مجلس القسم المختص أو المجالس المختصة، تجميد البرنامج إذا لزم الأمر.

مادة (13) شروط القيد ومتطلبات الإلتحاق

كلية الهندسة ببنها هي مؤسسة تعليمية حكومية تتبع جامعة بنها.و تتبع النظم و اللوائح الصادرة عن المجلس الأعلى للجامعات. كما أنها تقدم التعليم في البرامج المتخصصة مجانًا. و الطلاب الذين يستفيدون من هذا التعليم المجاني هم أولئك الذين أكملوا شهادة الثانوية المصرية (الثانوية العامة) أو ما يعادلها، والتحق بها من خلال مكتب التنسيق في نفس عام الحصول على هذه الشهادة أو ما يعادلها. يحافظ الطالب على تعليمه المجاني طالما أنجز الشروط المنصوص عليها في قانون تنظيم الجامعات و لائحته التنفيذية.

- يتم تقديم جميع البرامج في هذه اللوائح بنظام الساعات المعتمدة.
- تنقسم البرامج في هذه اللوائح إلى فئتين: تخصصية ومتعددة التخصصات.
- تضع الكلية من خلال مجلس الكلية القواعد العامة للالتحاق بالبرامج المختلفة بحيث تكون رغبة الطالب ومبدأ تكافؤ الفرص هي الأساس في قبول الطلاب بنظام الدراسة ببرامج الساعات المعتمدة بناء على القدرة الاستيعابية للكلية.
- يسمح لطلاب التعليم المجاني بالتسجيل في البرامج المتخصصة، بينما تخضع قواعد الالتحاق بالبرامج متعددة التخصصات (المعروفة سابقًا باسم البرامج المميزة) للوائح المنظمة في هذا الشأن طبقا لما تضعه الجامعة من شروط ولها رسوم دراسية منفصلة طبقا للائحة الأكاديمية الموحدة بالجامعة.

- الطلاب غير الملتحقين مباشرة بكلية الهندسة ببنها من خلال مكتب التنسيق ولكنهم حققوا الحد الأدنى للقطاع الهندسي يخضعون لقواعد التحويل الصادرة من المجلس الأعلى للجامعات في هذا الشأن سنة الالتحاق، أما طلاب السنوات السابقة يتم قبولهم شرط أن ينضم إلى البرامج متعددة التخصصات ذات الرسوم الدراسية المنفصلة التي يقررها مجلس الكلية كل عام.
- الطلاب المقيدين مباشرة بكلية الهندسة ببنها من خلال مكتب التنسيق، لهم الحق في الانضمام إلى البرامج متعددة التخصصات التي تدفع رسوم دراسية منفصلة.
- يمكن لمجلس الكلية تقديم منح دراسية إضافية بالبرامج متعددة التخصصات التي تدفع رسوم دراسية منفصلة للطلاب الذين حققوا الحد الأدنى من المعدل التراكمي، أو الطلاب ذوي القدرات المالية المحدودة، وفق القواعد التي يعلنها المجلس كل عام بناء على اقتراح مجلس إدارة البرامج.
- يتم إعفاء أعلى ثلاثون طالب من أوائل الثانوية العامة - القسم العلمي (شعبة الرياضيات إن وجدت) طبقا للترتيب التكراري من رسوم الدراسة عند الالتحاق بالبرامج متعددة التخصصات. ويستمرالإعفاء طيلة مدة الدراسة إذا حافظ الطالب على معدل تراكمي لا يقل عن 3.7 في كل فصل دراسي، وإلا فإن الطالب سيفقد هذا الامتياز وسيتم تطبيق القواعد الأخرى عليه.
- يتم إعفاء الطلاب الخمسة الأوائل في الفرقة الإعدادية في أي كلية هندسة حكومية من الرسوم الدراسية عند الإلتحاق بالبرامج متعددة التخصصات و يستمر الإعفاء إذا حافظ الطالب على معدل تراكمي 3.7 أو أكبر وإلا فإن الطالب سيفقد هذا الامتياز وسيتم تطبيق القواعد الأخرى عليه.
- يتم منح الطلاب المتفوقين دراسيا داخل البرامج متعددة التخصصات تخفيضات في الرسوم الدراسية كالتالي:
  - إذا كان GPA≥ 3.7 تخفيض يصل إلى 20 %
  - إذا كان 3.3≤ GPA≤3.7 تخفيض يصل إلى 10 %
- إذا لم يحقق طالب البرامج المتخصصة معدل تراكمي ≤2.0 لمدة 4 فصول دراسية رئيسية متتالية، يمكن السماح له بتسجيل مقررات لفصلين دراسيين لرفع معدله و في حالة عدم تحقيق ذلك يمكن للطالب الانتقال إلى البرامج متعددة التخصصات مع دفع الرسوم الدراسية المقررة.
- إذا رسب الطالب المسجّل في أي من البرامج المتعددة التخصصات- في مقرر ما مرتين، فيُسمح له بتسجيل هذا المقرر مرة أخرى لمدة 4 مرات أخرى مقابل رسوم إضافية يقررها مجلس الكلية كل عام في سنة تسجيل المقرر.

- يسمح لطلبة البرامج المتخصصة بالتسجيل في المقررات المطلوبة للحصول على الدرجة ضمن متطلبات برنامجه. وأي ساعات معتمدة مسجلة بعد الساعات المعتمدة المطلوبة للبرنامج لأي سبب من الأسباب غير المقبولة يتم تحصيل الرسوم الدراسية المنفصلة التي يقررها مجلس الكلية كل عام في سنة تسجيل المقرر.
- يمكن لطلاب البرامج المتخصصة فقط تسجيل المقررات في الفصول الدراسية الرئيسية. ومع ذلك فإنه يمكنهم ذلك تسجيل الدورات في الفصل الصيفي بدفع الرسوم الدراسية المنفصلة التي يقررها مجلس الكلية كل عام في سنة تسجيل المقرر.
- لكي يكون الطالب منتظما في البرنامج يجب أن يكون مسجلا ل12 ساعة معتمدة على الأقل (مالم يكون الطالب خريجا) بعد موافقة المرشد الأكاديمي ومنسق البرنامج وألا تزيد عدد الساعات المسجلة عن 21 ساعة معتمدة طبقا لقواعد التسجيل و المعدل العام للطالب.
- يمكن لأي طالب غير ملتحق بكلية الهندسة ببنها دراسة أي عدد من المقررات مع سداد الرسوم الدراسية التي يقررها مجلس الكلية كل عام في سنة تسجيل المقرر، و يحصل الطالب على بيان الدرجات طبقا للائحة.

مادة (15) قواعد التحويل (تغيير البرنامج الدراسى) وإعادة القيد داخل الجامعة

- يجوز تحويل الطلاب من برنامج هندسى بنظام الساعات المعتمدة (من داخل الكلية) إلى أي من البرامج المدرجة فى لائحة الكلية وفقا للقواعد التى يحددها مجلس الكلية طالما لم يجتز الطالب 50% من متطلبات التخرج و بعد إجراء المقاصة اللازمة.
- على الطلاب الملتحقين ببرنامج و يرغبون فى الالتحاق للدراسة فى برنامج آخر، يجب عليهم أن يكونوا قد أنهوا مقررات المستوى العام بمتوسط تراكمى لايقل عن 2.0 وطبقا للقواعد التى يحددها مجلس الكلية ويقرها مجلس الجامعة بناء على القدرة الاستيعابية.
- إذا كان التحويل من كلية أخرى داخل الجامعة لايتم التحويل إلا عن طريق مكتب التحويلات المركزى بإدارة الجامعة ومع بداية العام الدراسى وبعد عمل المقاصات اللازمة .
- يستخدم الجدول رقم (3) لحساب التقديرات المكافئة عند تحويل الطالب من النظام الفصلى إلى نظام الساعات المعتمدة.
- يجوز قبول الطلاب الوافدين الحاصلين على الثانوية العامة أو مايعادلها وفقا للترشيحات التى ترد للكلية من الإدارة العامة للوافدين ويتولى مجلس الكلية اقتراح مقابل تكلفة الخدمات التعليمية بخلاف الرسوم الجامعية ويتم القبول طبقا للقواعد المنظمة.

مادة (16) قواعد التحويل من الجامعات الأخرى

يتم تقديم طلبات التحويل من جامعات أخرى طبقا للشروط التالية :

- يتم التحويل عن طريق مكتب التحويلات المركزى بإدارة الجامعة.
- أن يستوفى الطالب قواعد القبول بالكلية والشروط الأخرى التى يحددها المجلس الأعلى للجامعات.
- يجوز لمجلس الكلية قبول طلاب محولين من كليات هندسية حكومية تطبق النظام الفصلى فى بعض البرامج بالكلية بعد عمل المقاصات اللازمة للتحويل من النظام الفصلى إلى نظام الساعات المعتمدة طبقاً للأطر التى تضعها لجنة قطاع الدراسات الهندسية مع الالتزام بما نص عليه البند السابق .
- يجوز تحويل الطلاب من برامج ساعات معتمدة بجامعات أخري إلي البرامج متعددة التخصصات بالكلية بعد عمل المقاصات المطلوبة حيث لايتم احتساب أكثر من 50% من الساعات المعتمدة اللازمة لاجتياز البرنامج المحول إليه من الساعات التي أنهاها الطالب قبل التحويل بشرط عدم مرور أكثر من خمس سنوات دراسية على اجتيازها. و في جميع الأحوال يتم إجراء مقاصة لما درسه ليتم حسابه ضمن متطلبات الحصول على الدرجة دون احتسابها في حساب المعدل التراكمي للطالب.
- عدم احتساب أى ساعات معتمدة لمقررات مضى على دراستها خمس سنوات أكاديمية.
- لا يسمح بنقل الطلاب المفصولين من كليتهم بسبب تجاوزهم الحد الأقصى للفرص الأكاديمية أو الرسوب.

جدول رقم (3) التقديرات المكافئة عند التحويل من النظام الفصلى إلى نظام الساعات المعتمدة

النسبة المئوية	نظام الساعات المعتمدة	
	عدد النقاط	التقدير المناظر
95% فأكثر	4.0	A+
90% الى أقل من 95%		A
85% الى أقل من 90%	3.70	A-
80% الى أقل من 85%	3.30	B+
75% الى أقل من 80%	3.00	B
71% الى أقل من 75%	2.70	B-
68% الى أقل من 71%	2.30	C+
65% الى أقل من 68%	2.00	C
60% الى أقل من 65%	1.70	C-
55% الى أقل من 60%	1.30	D+
50% الى أقل من 55%	1.00	D
أقل من 50%	0.00	F

مادة (17) الدراسة فى جامعات اخرى

يسمح للطالب بدراسة ما لايزيد عن (40%) من الساعات المعتمدة للبرنامج الدراسي المقيد فيه الطالب فى جامعة أخرى معترف بها من المجلس الأعلى للجامعات وتحسب لهم هذه الساعات وفق الشروط التالية:

1- أن يكون الطالب أنهى بنجاح مالايقل عن 36 ساعة معتمدة بالبرنامج فى كلية الهندسة ببنها.

2- أن يحصل الطالب على توصية بالموافقة على المقررات التى سيقوم بدراستها فى الجامعة الأخرى من المرشد الأكاديمى وتعتمد من مجلس الكلية.

3- أن يتوافق المحتوي العلمي للمقرر فى حدود 80%.

4- أن يكون الطالب قد اجتاز كل المقررات المتطلبة للمقرر.

مادة (18) متطلبات الحصول على الدرجة

يشترط لحصول الطالب على درجة بكالوريوس العلوم في الهندسة:

1- اجتياز الساعات المعتمدة المطلوبة (160 ساعة معتمدة) بنجاح في أحد البرامج وفقًا للمتطلبات المنصوص عليها مع معدل تراكمي لا يقل عن 2.0.

2- النجاح فى جميع المقررات الدراسية التى لها (0) ساعة معتمدة .

3- مشروع التخرج هو جزء أساسي من متطلبات البرامج للتخرج. يمكن أن يكتمل مشروع التخرج على مدى فصلين دراسيين متتاليين حسب متطلبات البرنامج، ولن يتخرج الطالب ما لم يستوف متطلبات النجاح في المشروع.

4- يجب أن يقوم الطالب بالتدريب الميدانى مرتين علي الأقل بمدة لا تقل عن 4 أسابيع لكل تدريب خلال فترة دراسته.

5- يجب على الطالب أن يكون قد اجتاز 70% من الساعات المعتمدة على الأقل حتى يمكنه التسجيل فى مشروع التخرج .وإذا كان المشروع ينقسم إلى فصلين دراسيين فعلى الطالب أن يدرسهما وفقا لترتيبهما.ولايجوز التسجيل لمشروع التخرج خلال الفصل الدراسى الصيفى.

على أن يكون توزيع المقررات التى يحتوى عليها البرنامج (جدول 4)على النحو التالى:

جدول (4) توزيع المقررات الدراسية داخل البرنامج

المجموعات التخصصية	الحد الأدنى	الحد الأقصى	المكونات الأساسية
متطلبات الجامعة	%8	--	بناء شخصية الخريجين الثقافية ، وتنمية مهارتهم الشخصية ، والإدراك العام بقضايا المجتمع والتركيز على الهوية والإرتباط بالوطن
متطلبات الكلية	%20	--	الحد الأدنى للعلوم الأساسية والثقافة الهندسية والعلوم الهندسية الأساسية حول كافة التخصصات
متطلبات التخصص العام	%35	--	العلوم الهندسية الأساسية ومبادئ التصميم والتطبيقات فى التخصص العام (معلومات عن جميع التخصصات الدقيقة)
متطلبات التخصص الدقيق	--	%30	المهارات والعلوم الهندسية والتصميمات والتطبيقات الهندسة التخصصية

مع مراعاة أن تحقق الخطط الدراسية لكل برنامج المقررات والنسب الاسترشادية التى وضعتها الهيئة القومية لضمان جودة التعليم وتشمل المقررات التالية

1- العلوم الإجتماعية والإنسانية
2- إدارة الأعمال
3- العلوم الأساسية
4- الثقافة الهندسية
5- العلوم الهندسية الأساسية
6- التطبيقات الهندسية والتصميم
7- مشروع التخرج والتدريب الميدانى

مادة (19) مدة الدراسة

- تمنح الدرجة العلمية متى استوفى الطالب متطلبات الحصول عليها وفقا لما تحدده اللائحة الداخلية للبرنامج.
- يمكن أن يسمح للطالب المتفوق بالتخرج والحصول على درجة البكالوريوس فى الهندسة بنظام الدراسة بالساعات المعتمدة، فى مدة 4 سنوات دراسية، أو (ثمانية فصول دراسية رئيسية)، بعد اجتياز كافة متطلبات التخرج، هذا بالإضافة لمدة الدراسة العادية.
- الحد الأقصى للدراسة ضعف المدة المنصوص عليها والمقترحة فى البرنامج وهو ما لايشمل الفصول الدراسية المجمدة لأسباب مقبولة من مجلس الكلية وبعد هذه المدة يتم فصل الطالب من البرنامج.

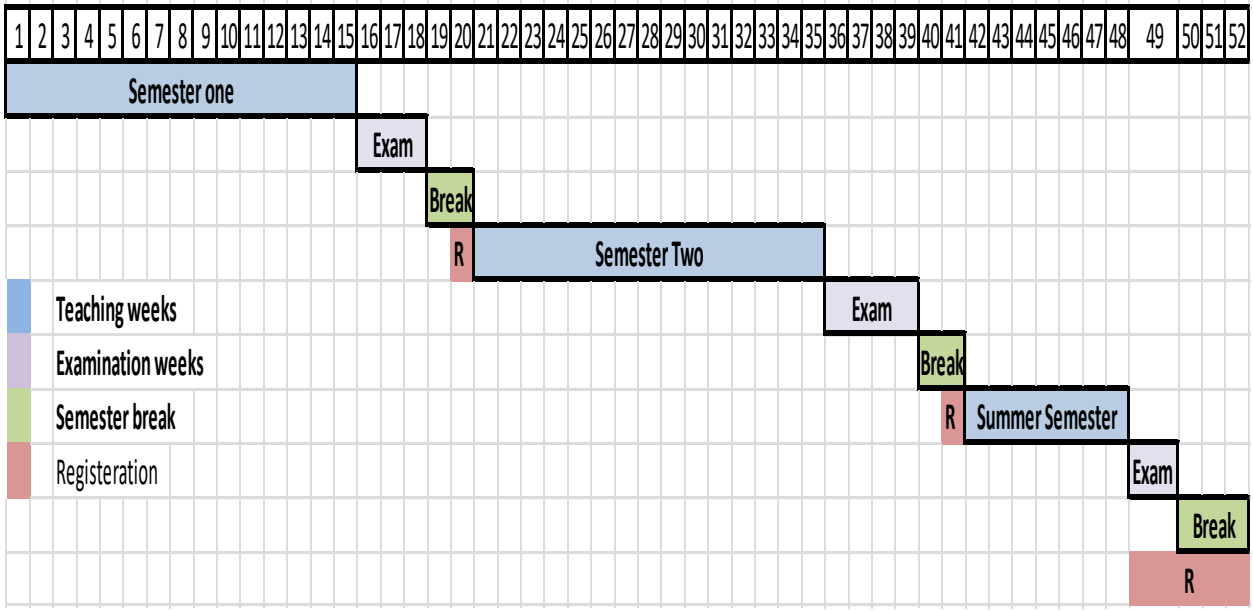
مادة(20) مواعيد الدراسة

تنقسم السنة الأكاديمية إلى ثلاثة فصول كالتالى:

1. **الفصل الدراسى الأول - فصل الخريف** (فصل رئيسى) ويبدأ مع بداية العام الدراسى الجامعى ولمدة 15 أسبوعا تدريسا.
2. **الفصل الدراسى الثانى- فصل الربيع** (فصل رئيسى) ويبدأ بعد إجازة منتصف العام الجامعى ولمدة 15 أسبوعا تدريسا.
3. **الفصل الدراسى الصيفى (فصل اختيارى)** ويبدأ فى شهر يوليو ولمدة 7 اسابيع تدريسية مع مضاعفة ساعات المقررات الدراسية.

يتم القيد والتسجيل قبل بداية كل فصل دراسى طبقا للتقويم الأكاديمي (شكل رقم 1)

Figure 1 Academic Calendar.



مادة (21) الأقسام العلمية المشتركة فى تنفيذ برامج الساعات المعتمدة

يشرف مجلس القسم المختص على تدريس جميع المقررات الدراسية (التخصصية) و القيام بكافة متطلبات الجودة و التقرير السنوي و الاستبيانات المقررة من قبل مجلس الكلية للبرنامج الذى يتبعه ويتم تدريس مقررات العلوم المختلفة من خلال الأقسام التالية كل فى تخصصه:

1- قسم الهندسة الميكانيكية .
2- قسم الهندسة الكهربية .
3- قسم الهندسة المدنية .
4- قسم الهندسة المعمارية.
5- قسم العلوم الهندسية الأساسية.
6- أقسام خارجية من كليات الطب فى برنامج الهندسة الطبية الحيوية.
7- أقسام خارجية من كليات الحقوق فى مجال التشريعات والقوانين والعقود والإنسانيات.
8- أقسام خارجية من كليات التجارة فى مجال اللوجستيات والإدارة .

لغة الدراسة و الاختبارات هى اللغة الإنجليزية ويجوز تدريس بعض المقررات باللغة العربية مثل الإنسانيات.

مادة (22) طرق التدريس والوسائل التعليمية

تعتمد الكلية على طرق التدريس التقليدية والحديثة على النحو التالى:

- **الطرق التقليدية** حيث تقوم على وسيلة يعرض بها المحاضر المادة العلمية وينقلها إلى طلابه بعد تبسيطها وتقوم هذه الطريقة فى الغالب على شرح المحاضر وفاعاليته.

- **الطرق الحديثة** تقوم على التفاعل بين المحاضر والطالب معا ، بمعنى أن يشترك كلاهما فى البحث عن المعلومة والتعلم الذاتى الذى يؤدى إلى إطلاق طاقات الطلاب وإبداعاتهم ويدفعهم للتعلم وتعتبر الوسائل الحديثة عنصرا من عناصر العملية التعليمية وتستخدم الكلية الوسائل التالية :
  - الوسائل البصرية (أجهزة العرض الضوئية المتصلة بالحاسب).
  - وسائل أخرى (الحاسب الألى – السبورات الذكية – المحاضرات عبر الإنترنت والفيديو).
  - دعوة الخبراء والمتخصصين من الصناعة أو ذوى الخبرة لعرض قصص النجاح والتطبيق العملي للدراسة.
  - يجوز لمجلس الكلية بعد أخذ رأى مجلس القسم المختص وحسب طبيعة المقررات الدراسية أن يقرر تدريس مقرر أو أكثر بنمط التعليم الهجين، بحيث تكون الدراسة فى المقرر بنسبة 60-70% وجهاً لوجه و30-40% بنظام التعليم عن بعد، وعلى أن يتم عرض ذلك على مجلس شئون التعليم والطلاب بالجامعة للموافقة عليه ورفعه إلى مجلس الجامعة لاعتماده.

مادة (23) قواعد الإنتظام فى الدراسة

الطلاب المسجلين بالبرامج عليهم الالتزام بالقواعد التالية:

(1) سداد الرسوم الدراسية

يتم دفع رسوم التسجيل والخدمات التعليمية طبقا لما يقرره مجلس الجامعة فى هذا الشأن.

(2) انتظام الحضور

يتولى أستاذ كل مقرر تسجيل حضور وغياب الطلاب عن المحاضرات أوالتمارين التطبيقية أو العملية ويخطر بذلك منسق البرنامج:

- يتم إنذار الطالب إنذارا أوليا عند تجاوزه نسبة غياب 10% من مجموع المحاضرات و التمارين.
- يتم إنذار الطالب إنذارا ثانيا عند تجاوزه نسبة غياب 20% من مجموع المحاضرات و التمارين.
- اذا زادت نسبة غياب الطالب عن 25% من مجموع المحاضرات و التمارين بدون عذر مقبول ومعتمد من مجلس الكلية يتم حرمان الطالب من دخول امتحان المقرر.
- إذا زادت نسبة الغياب للطالب عن 25% وكان غيابه بعذر مقبول يقبله مجلس الكلية يسجل للطالب تقدير غير مكتمل ولا تدخل فى حساب أيا من المعدل الفصلى أو التراكمى للطالب.

(3) إيقاف قيد الطالب

فى حالة قيام ولي أمر الطالب بتقديم طلب بإيقاف قيده فعليه سداد الرسوم الدراسية الإدارية الخاصة بذلك على أن يتم وقف القيد فى المواعيد المحددة من قبل مجلس الكلية.

(4) تغيير عنوان الطالب

على ولي أمر الطالب أن يخطر إدارة البرنامج بأى تغيير يحدث فى محل إقامته حتى تتم المراسلات للطالب على عنوانه الصحيح أو من خلال النظام الإلكتروني أو الإيميل الجامعي.

مادة (24) الفصل من الدراسة والإنذار الأكاديمى

- يحصل الطالب على إنذار أكاديمى إذا كان معدله التراكمى فى أى فصل دراسى رئيسى أقل من 2.0.

- يتم فصل الطالب من الدراسة إذا حصل على ستة إنذارات أكاديمية متتالية.
- إذا تجاوز المعدل الفصلى للطالب 2.0 فى أى فصل دراسى رئيسى ، فإنه يتم إعادة حساب عدد الإنذارات الأكاديمية المتتابعة.
- يتم فصل الطالب إذا لم يحقق متطلبات التخرج خلال المدة القصوى للدراسة (ضعف مدة البرنامج) طبقا للائحة.
- الطالب المعرض للفصل من الدراسة بسبب انخفاض معدله الفصلى إلى عن 2.0 تتاح له فرصة إضافية ونهائية للتسجيل بحد أقصى فصليين دراسيين رئيسيين متتالين بالإضافة إلى فصل الصيف لتحقيق متطلبات التخرج شريطة أن يكون أنجز بنجاح ما لايقل عن 80% من العدد الإجمالى للساعات المعتمدة اللازمة لتخرجه.

مادة (25) شروط تسجيل المقررات الدراسية

- يمكن للطالب أن يسجل مقررات دراسية فى الفصول الدراسية الرئيسية وفقا للقواعد التالية (بعد موافقة المرشد الأكاديمى للطالب)
  - حتى 21 ساعة معتمدة وذلك للطالب الحاصل على معدل تراكمى أكبر من أو يساوى 3.0
  - حتى 18 ساعة معتمدة وذلك عند التسجيل فى أول فصل دراسى للطالب أو للطالب الحاصل على معدل تراكمى أكبر من أو يساوى 2.0 .
  - حتى 14 ساعة معتمدة وذلك للطالب الحاصل على معدل تراكمى أقل من 2.0.
  - الحد الأدني لعدد الساعات المعتمدة المسجلة هو 12 ساعة معتمدة.
- يمكن للطالب تسجيل مقررات فى الفصل الدراسى الصيفى طبقا للقواعد التالية (بعد موافقة المرشد الأكاديمى)
  - حتى 9 ساعات معتمدة وذلك للطالب الحاصل على معدل تراكمى أكبر من أو يساوى 3.0 مالم يكن مسجلاً للتدريب الميداني.
  - حتى 8 ساعات معتمدة وذلك للطالب الحاصل على معدل تراكمى أقل من 3.0 مالم يكن مسجلاً للتدريب الميداني.
  - إذا كان الطالب مسجلاً للتدريب الميداني يمكنه تسجيل مقرر واحد بحد أقصي 3 ساعات معتمدة.
- يمكن للطالب تسجيل مقرر دراسى إضافى واحد عن الحدود المذكورة أعلاه إذا كان ذلك يؤدى إلى تخرجه وذلك بعد موافقة المرشد الأكاديمى.
- يسمح لإدارة البرنامج تحديد المقررات الدراسية التى يتم طرحها كل فصل دراسى عدا المقررات الضرورية للتخرج فيتم إتاحتها للتسجيل كل فصل دراسى.
- يمكن للطلاب التسجيل كمستمعين في بعض المقررات الدراسية وغير مسموح لهم دخول الامتحان النهائي للمقرر إلا بعد موافقة المرشد الأكاديمي و منسق البرنامج.

مادة (26) مستويات الدراسة

كلما استكمل الطالب نسبة محددة من متطلبات البرنامج سوف يتم نقله من مستوى للمستوى التالى ويوضح الجدول رقم (5) حالة الطالب استنادا إلى نسبة عدد الساعات المعتمدة التى تم اجتيازها بنجاح

جدول رقم (5) حالة الطالب استنادا إلى عدد الساعات المعتمدة المجتازة

المستوى الدراسى	تعريف موقع الطالب	نسبة عدد الساعات المعتمدة التى اجتازها الطالب بنجاح
الأول	المستوى العام (Freshman)	من 0 الى أقل من 25%
الثانى	المستوى الأول(sophomore)	من 25 الى أقل من 50%
الثالث	المستوى الثانى (Junior)	من 50 الى أقل من 75%
الرابع	المستوى الثالث(Senior)	من 75 الى 100%

مادة (27) التدريب الميداني

- يشمل كل برنامج تدريب ميداني لمدة لاتقل عن ثمانية أسابيع داخل القطاعات المتخصصة تحت إشراف أعضاء هيئة التدريس.
- يتولى متابعة التدريب مشرف معين من قبل إدارة البرنامج و يمنح بدل انتقال مرة واحدة أسبوعيا.
- يتم تحديد مسؤول الاتصال بجهة التدريب.
- يجب على الطالب تقديم تقرير فني إلى المشرف الأكاديمي في نهاية فترة التدريب.
- يجب على المنشأة تقديم تقييم للطالب إلى المشرف الأكاديمي في نهاية فترة التدريب.
- ينقسم التدريب إلى فترتين كل فترة 4 أسابيع على الأقل و يشترط اجتياز الطالب 65 ساعة ، و 96 ساعة من الساعات المعتمدة على الترتيب.
- يتم تقييم التدريب الميداني على أساس النجاح / الرسوب ولا يتم احتسابه في حساب المعدل التراكمي.

مادة(28) إضافة وحذف المقررات الدراسية

- يسمح للطالب أن يضيف مقرر دراسى فى الأسبوع الأول من الفصول الدراسية الرئيسية أو فى الأيام الثلاثة الأولى من الفصل الدراسى الصيفى .
- يمكن للطالب أن يحذف المقررات الدراسية المسجل بها حتى نهاية الأسبوع الثانى من الفصول الدراسية الرئيسية أو نهاية الأسبوع الأول من الفصل الدراسى الصيفى .
- لايجب أن يؤدى إضافة أو حذف المقررات الدراسية إلى مخالفة الحد الأدنى أو الحد الأقصى لعدد الساعات المعتمدة لكل فصل دراسى .

مادة(29) الانسحاب من المقررات الدراسية

- يمكن للطالب الانسحاب من المقرر الدراسى خلال الأسابيع العشرة الأولى من الفصول الدراسية الرئيسية أو خلال الأسابيع الخمسة الأولى للفصل الدراسى الصيفى .
- لايرسب الطالب فى المقرر المنسحب منه ، شريطة أن يتم الانتهاء من طلب الانسحاب والموافقة عليه خلال المدة الزمنية المحددة.
- يحصل الطالب على تقدير (W) للمقرر المنسحب منه ويسمح له بتسجيل هذا المقرر (الحضور الكامل وأداء جميع الأنشطة بما فى ذلك الامتحانات) فى الفصول الدراسية اللاحقة .

- بالنسبة للمقرر الاختيارى ، يسمح للطالب بتغييره فى الفصول الدراسية اللاحقة إذا رسب فى اجتيازه أو قام بالانسحاب منه . وهذا يخضع لموافقة المرشد الأكاديمى للطالب ومتطلبات تخرجه.

مادة(30) المقررات الدراسية غير المكتملة

- إذا لم يحضر الطالب الامتحان النهائى للمقرر الدراسى بعذر مقبول من قبل اللجنة المختصة بشئون البرنامج المسجل به ووافق عليه مجلس الكلية ، فإن المقرر يعتبر غير مكتمل (I) .
- يحصل الطالب على تقدير (I) فى المقرر غير المكتمل ولن يدخل فى حساب المعدل التراكمى للطالب، وذلك حتى يتم إجراء الامتحان فى هذا المقرر فى الموعد التالى المتاح لامتحان هذا المقرر.
- إذا لم يقم الطالب بإجراء الامتحان النهائى للمقرر غير المكتمل فى الموعد التالى المتاح لامتحان هذا المقرر فإنه يحصل على تقدير (F) فى المقرر الدراسى .
- إذا قام الطالب بإجراء الامتحان النهائى للمقرر غير المكتمل فى الموعد التالى المتاح لامتحان هذا المقرر تضاف درجات هذا الامتحان النهائى إلى درجات أعمال الفصل الدراسى وذلك لحساب التقدير الكلى لهذا المقرر الدراسى.

مادة(31) إعادة المقررات الدراسية

- يمكن للطالب إعادة مقرر دراسى دراسة وامتحانا لمرة واحدة بهدف التحسين إذا كان تقديره فى هذا المقرر يستوفى شرط الحد الأدنى من النجاح وفقا للقواعد التالية.
  - يحصل الطالب على التقدير الأعلى فى المقرر الدراسى بعد الإعادة . وهذا التقدير هو الذى سيتم احتسابه فى المعدل التراكمى للطالب . شريطه أن تظهر الإعادة فى شهادة الطالب.
  - الحد الأقصى لعدد المرات التى يمكن للطالب تكرارها بهدف التحسين هو خمس مرات خلال مدة دراسته . ويستثنى من ذلك المقررات الدرسية التى يتم التحسين فيها تلبية لمتطلبات التخرج.
  - فى حالة رسوب الطالب فى الإعادة إذا كان بغرض تحسين التقدير، فيلغى تقديره السابق للمقرر ولايعتد به بعد ذلك ويعتبر راسبا ويحصل على تقدير (F).
  - إذا رسب الطالب فى مقرر دراسى (حاصل على تقدير F)، فإنه يطلب منه إعادة جميع متطلبات المقرر (الحضور الكامل وأداء جميع الأنشطة بما فى ذلك الامتحانات) وفقا للقواعد التالية:
    1- أقصى تقدير للمقرر الدراسى المعاد هو B^+ .
    2- يحصل الطالب على تقدير المقرر الدراسى بعد الإعادة وهذا التقدير هو الذى سيتم احتسابه فى المعدل التراكمى للطالب شريطة أن تظهر الإعادة فى شهادة الطالب.
  - إذا قام الطالب بإعادة مقرر دراسى، فإنه يطلب منه أن يعيد جميع متطلبات تقييم المقرر الدراسى حتى يعاد تقييمه بالكامل. حيث يعاد احتساب تقدير المقرر الدراسى.
  - يجوز السماح للطالب إذا رسب فى مقرر دراسى (حصل على تقدير F)، بإعادة الامتحان النهائى (فى ذات الفصل الدراسى) خلال المدة التى تقرها اللائحة، ولمقرر دراسى واحد فقط للطالب، ووفقا للقواعد الأتية :
    - ألا تقل درجة الطالب فى الامتحان النهائى للمقرر عن 50% من درجة الامتحان، وألا تقل نتيجة الطالب فى المقرر عن 55% من إجمالى درجات المقرر.
    - ألا يزيد تقدير الطالب فى المقرر بعد الإعادة عن C^-.
    - فى حالة رسوب الطالب فى الامتحان التكميلى عليه إعادة المقرر دراسة وامتحان طبقا لقواعد الإعادة .
    - فى حالة الضرورة (عدم اكتمال عدد الساعات المعتمدة المصرح بها فى الفصل الدراسى) يجوز للطالب الراسب فى متطلب سابق، بتوصية المرشد الأكاديمى وموافقة لجنة التعليم بالكلية، التسجيل فى مقرر بالتزامن مع المتطلب السابق، ويعلق نجاح الطالب فى المقرر حتى يجتاز الطالب المتطلب السابق بنجاح.

مادة(32) الامتحانات والتقييم للمقررات الدراسية

- تحسب الدرجة لكل مقرر من مائة درجة.
- الدرجة الكلية لكل مقرر هى مجموع درجات الامتحان النهائى ودرجات الأعمال الفصلية موزعة طبقاً للجدول رقم (6) المرفق بالنسبة للبرامج التخصصية ، ويكون الامتحان النهائى تحريرياً ويستثنى من ذلك مشروع التخرج والمقررات التى يحدد وصف المقرر باللائحة (Course syllabus) أن الامتحان النهائى يكون شفهيا أو باستخدام الحاسب الآلى أو بأى طريقة أخرى.

جدول رقم (6) توزيع درجات المقرر للبرامج التخصصية

نوع الإمتحان	المقرر نظري/عملي	المقرر نظري فقط	المقرر عملي فقط	المشروع
الامتحان النهائي	%40	%40	%40	%50
امتحان فصلي	%30	%30	%30	–
امتحان شفوى/عملى	%20	-	-	
أعمال فصلية و خلافه	%10	%30	%30	%50

يعتبر الطالب راسبا ويحصل على تقدير (F) إذا حصل على أقل من 40% من درجات الاختبار النهائى وبغض النظر عن مجموع درجاته بالمقرر.

- يعتبر الطالب راسبا ويحصل على تقدير (F) إذا حصل على أقل من 60% من الدرجات الكلية للمقرر، أو تم حرمانه من حضور الامتحان النهائى بسبب تجاوز نسبة الغياب أو الغش..إلخ، أو لم يحضر الامتحان النهائى دون تقديم عذر مقبول من قبل مجلس الكلية .
- المقررات الدراسية التى لها (0) ساعة معتمدة يكون التقدير فيها راسب أو ناجح ويجب على الطالب الحصول على 60% من درجات المقرر ليعتبر ناجحا ولايدخل هذا المقرر فى حساب المعدل الفصلى، أو المعدل التراكمى.
- يكون الامتحان الفصلي للمقرر امتحانا واحدا على أن يعقد فى الأسبوع السابع من بداية كل من الفصليين الدراسيين الرئيسيين (الخريف والربيع) وفى الفصل الصيفى يعقد فى الأسبوع الرابع . وقد تشمل الأعمال الفصلية تقاريرا، أو بحوثا، أو مشاريع مصغرة .. إلخ طبقا لما هو موضح فى وصف المقرر (Course syllabus).
- يكون منسق المقرر(يحدده منسق البرنامج) من أحد المحاضرين القائمين بتدريس المقرر على أن يكون عضوا بلجنة تصحيح المقرر فى مراجعة التوزيع الإحصائى لتقديرات الطلاب بناء على الآليات التى يضعها مجلس الكلية . وبالنسبة لمقررات العلوم الإنسانية والاجتماعية ومقررات إدارة الأعمال ومقررات الثقافة الهندسية التى لاترتبط ببرنامج معين فيكون وكيل الكلية لشئون التعليم والطلاب، أو من يفوضه منسقا عليها.
- المقررات العملية أو المقررات التي لها شق عملي سيكون الامتحان النهائى لها هو امتحان عملي و يقسم الطلاب إلى مجموعات و كل مجموعة 5 طلاب و تكون لجنة الامتحان مكونة من 4 أعضاء هيئة تدريس.
- بالنسبة لمشروع التخرج-1 سيكون الامتحان النهائى له عبارة عن امتحان شفوى فى نهاية الفصل.
- بالنسبة لمشروع التخرج-2 يتم اقتراح تشكيل لجان من قبل منسق البرنامج لمناقشة المشاريع بنهاية الفصل و يفضل وجود عضو من خارج الكلية ضمن تشكيل اللجنة و يعتمد من مجلس إدارة البرامج.

- يحدد مجلس الكلية آلية تقديم ودراسة التظلمات والفترة الزمنية اللازمة لذلك.
- تحدد مدة الامتحان النهائى بساعتين لجميع المقررات ، ماعدا مقررات الرسم والتصميم والمقررات المشابهة لها فيجوز زيادتها إلى أكثر من ذلك ويصدر قرارا من مجلس الكلية بذلك لتحديد هذه المقررات.
- يجب أن ينص توصيف المقرر على توزيع الدرجات لطرق التقييم المختلفة. ويجوز لمجلس الكلية أن يعدل توزيع الدرجات لمقرر ما وذلك بناء على اقتراح مجلس القسم بعد التنسيق مع منسق البرنامج وإعلان ذلك التوزيع للطلاب قبل بدء الفصل الدراسى .
- يجوز لمجلس الكلية بعد أخذ رأى مجلس القسم المختص وحسب طبيعة المقررات الدراسية أن يقرر عقد الامتحانات إلكترونيا فى مقرر أو أكثر، كما يجوز عقد الامتحان فى كل المقرر أو جزء منه بما يسمح بتصحيحه إلكترونيا وعلى أن يتم عرض ذلك على مجلس شئون التعليم والطلاب بالجامعة للموافقة عليه ورفعه إلى مجلس الجامعة لاعتماده.

مادة(33) تقديرات المقررات الدراسية

- بالنسبة للمقررات التى يسجل الطالب فيها كمستمع أو أن يطلب منه فقط اجتياز المقرر (المقررات الدراسية ذات عدد الساعات المعتمدة الصفرية ، المقررت الدراسية غير المدرجة فى حساب المعدل التراكمى) ستكون تقديرات الطالب طبقا للجدول رقم (7).

جدول رقم (7) تقديرات المقررات الدراسية ذات عدد الساعات المعتمدة الصفرية

التقدير	المدلول	التفاصيل
Au	مستمع (Audience)	يرصد للطالب المسجل مستمع
P	ناجح (Pass)	يرصد للطالب الناجح
F	راسب (Fail)	يرصد للطالب الراسب
W	منسحب (Withdraw)	يرصد للطالب المنسحب من مقرر بناءً علي طلبه
I	مقرر غير مكتمل (Incomplete)	يرصد للطالب الذي تعذر عليه إستكمال متطلبات المقرر وتغيب في الإمتحان النهائي بعذر مقبول وقدم طلباً بذلك وتم قبوله طبقاً للقواعد.

- يتم حساب عدد النقاط لكل مقرر على أساس الدرجات التى يحصل عليها الطالب خلال دراسته لهذا المقرر (الأنشطة- امتحانات منتصف الفصل الدراسى – الامتحان العملى- الامتحان النهائى) ويوضح الجدول رقم (8) كيفية حساب عدد النقاط والتقدير من خلال الدرجات .
- يجب على الطالب الحصول على الحد الأدنى (D) لاجتياز أى مقرر دراسى والتى يتم استخدامه فى حساب المعدل التراكمى للطالب .

مادة (34) المرشد الأكاديمى

- يعين منسق البرنامج مرشد أكاديمى لكل طالب يتابع الطالب ويساعده فى اختيار المقررات الدراسية بكل فصل دراسى.
- المرشد الأكاديمى مسئول عن :
  - مساعدة الطالب فى تسجيل المقررات طبقا لمعدل الطالب.
  - مساعدة الطالب فى اختيار مساره الأكاديمى وكذلك فى اختيار المقررات بكل فصل دراسى .
  - مساعدة الطالب فى اختيار التدريب الميدانى.

- مساعدة الطالب فى اختيار التخصص ومشروع التخرج

- يجوز للمرشد الأكاديمى أن يطلب من الطالب إعادة مقررات دراسية نجح فيها الطالب بالفعل أو أن يطلب منه التسجيل فى مقررات دراسية إضافية ، وذلك بهدف رفع المعدل التراكمى المطلوب لكى يحقق الطالب متطلبات التخرج.

مادة (35) حساب المعدل التراكمى (GPA)

- تحسب نقاط المقررات الدراسية التى حققها الطالب على أنها عدد الساعات المعتمدة لهذا المقرر مضروبة فى نقاط التقدير وفقا لجدول رقم (7)
- يتم احتساب إجمالى النقاط التى حققها الطالب فى أى فصل دراسى على أنها مجموع نقاط المقررات التى اجتازها الطالب فى هذا الفصل الدراسى

يحسب المعدل التراكمى للطالب فى نهاية أى فصل دراسى باعتباره إجمالى عدد النقاط التى حققها الطالب فى جميع المقررات الدراسية التى تمت دراستها مقسوما على العدد الإجمالى للساعات المعتمدة لهذه المقررات ، مع مراعاة القواعد المتعلقة بإعادة القيد وتحسين المقررات .

$$Cumulative\ GPA = \frac{\sum_{Courses} Grade\ points * Credit\ Hours}{\sum_{Courses} Credit\ Hours}$$

- يحسب متوسط النقاط فى الفصل الدراسى باعتبار إجمالى النقاط التى حققها الطالب فى المقررات الدراسية فى هذا الفصل الدراسى مقسوما على العدد الإجمالى للساعات المعتمدة لهذه المقررات.
- المعدل التراكمى للتخرج هو المعدل التراكمى عند التخرج وذلك بعد اجتياز جميع متطلبات التخرج ولايمكن للطالب الحصول على درجة البكالوريوس إلا إذا حقق معدل تراكمى 2.0 على الأقل.
- يتحدد ترتيب الخريجين على أساس المعدل التراكمى للتخرج . فى حالة التساوى فى المعدل التراكمي يتم الترتيب طبقا للمجموع التراكمى للدرجات.

يجب أن تتضمن شهادة الطالب جميع المقررات الدراسية التى تم تسجيلها خلال مدة الدراسة ، بما فى ذلك المقررات الدراسية التى رسب فيها أو انسحب منها أو تم تحسينها.

مادة (36) مرتبة الشرف لطلبة البكالوريوس

لكى يحصل الطالب على مرتبة الشرف فإن عليه أن يستوفى الشروط التالية:

1. الحفاظ على معدل تراكمى لايقل عن 3.3 خلال فترة دراسته فى البرنامج مع تحقيق هذا المعدل على الأقل خلال جميع فصول الدراسة .
2. ألا يكون قد حصل على تقدير(F) فى أى مقرر دراسى خلال فترة دراسته.
3. ألا يكون قد تم توقيع أى عقوبات تأديبية عليه خلال فترة دراسته فى الكلية .

مادة (37) تكليف خريجى البرامج فى وظيفة معيد

يتم تكليف المعيدين من خريجى البرامج بقرار من رئيس الجامعة بناء على طلب من مجلس الكلية طبقا للمادة (133) من قانون تنظيم الجامعات وبما لايخل بتطبيق المادتين 135،136 من ذات القانون ويشترط ألا يقل معدله التراكمي عند التخرج عن B^+.

مادة (38) الإدارة الإلكترونية

تقوم الكلية بتصميم برنامج لإدارة نظم المعلومات للبرامج أو تتعاقد عليه وذلك لميكنة العمل بالبرامج بنظام الساعات المعتمدة و يشرف عليها منسق التحول الرقمي ويشتمل هذا البرنامج على البنود التالية :

1- تسجيل المقررات الدراسية .
2- إضافة وحذف المقررات الدراسية.
3- أعمال الإرشاد الأكاديمى.
4- أعمال إدارة البرنامج فى تحقيق القواعد المنظمة للبرنامج.
5- أعمال الكنترولات.
6- أعمال الدراسة والامتحانات .
7- الأعمال الخاصة بشئون الطلاب.
8- بيانات الحالة.
9- تقارير عن أداء الطلاب.
10- تسجيل غياب الطلاب.
11- التواصل مع الطلاب.
12- الإمتحانات الإلكترونية.
13- أعمال الجودة.

ويجب مراعاة الحفاظ على سرية البيانات واستدعائها، وسهولة الاستخدام للطالب وعضو هيئة التدريس والفريق الإدارى وإتاحة الدعم الفنى.

جدول رقم (8) تقدير المقررات وعدد النقاط المناظر

النسبة المئوية	نظام الساعات المعتمدة	
	عدد النقاط	التقدير المناظر
أكثر من 97%	4.0	A+
93% الى أقل من 97%		A
89% الى أقل من 93%	3.70	A-
84% الى أقل من 89%	3.30	B+
80% الى أقل من 84%	3.00	B
76% الى أقل من 80%	2.70	B-
73% الى أقل من 76%	2.30	C+
70% الى أقل من 73%	2.00	C
67% الى أقل من 70%	1.70	C-
64% الى أقل من 67%	1.30	D+
60% الى أقل من 64%	1.00	D
أقل من 60%	0.00	F

رابعا: تفاصيل البرامج المقدمة

تمنح جامعة بنها بناءً على طلب مجلس كلية الهندسة ببنها درجة بكالوريوس العلوم في أحد البرامج التي تقدمها كلية الهندسة ببنها، و التي تنقسم إلى برامج متخصصة (Disciplinary programs) ومتعددة التخصصات (Inter-Disciplinary Programs).

وفقًا للشروط المرجعية لنظام الدراسة بنظام الساعات المعتمدة بكليات الهندسة (2020) - المجلس الأعلى للجامعات، تنقسم المقررات الدراسية في أي برنامج إلى المتطلبات التالية:

1. متطلبات الجامعة.
2. متطلبات الكلية.
3. متطلبات التخصص.
4. متطلبات البرنامج.

يوضح الجدول (9) توزيع الساعات المعتمدة بين المتطلبات المختلفة لكل من البرامج المتخصصة ومتعددة التخصصات. بالنسبة للبرامج متعددة التخصصات، يتم تقسيم **114** ساعة معتمدة بين التخصصات المختلفة التي يتكون منها هذا البرنامج.

يوضح الشكل (2) المستويات المختلفة للجدارات كما تم نشرها في المعايير المرجعية الأكاديمية الوطنية (NARS-2018). تحدد هذه الجدارات توزيع المقررات في مستويات الجدارات المختلفة وفقا و متطلبات المستوى الدراسي.

جدول (9) تقسيم الساعات المعتمدة بين المتطلبات الأربعة.

		متطلبات الجامعة	متطلبات الكلية	متطلبات التخصص	متطلبات البرنامج
البرامج التخصصية (Specialized Programs)	الهندسة الميكانيكية	14 CH 8.75%	32 CH 20%	66 41.25%	48 30%
	الهندسة الكهربية			67 41.88%	47 29.37%
	الهندسة المدنية			114 CH 71.25%	
	الهندسة المعمارية			114 CH 71.25%	
البرامج متعددة التخصصات (Inter-Disciplinary Programs)				114 CH 71.25%	

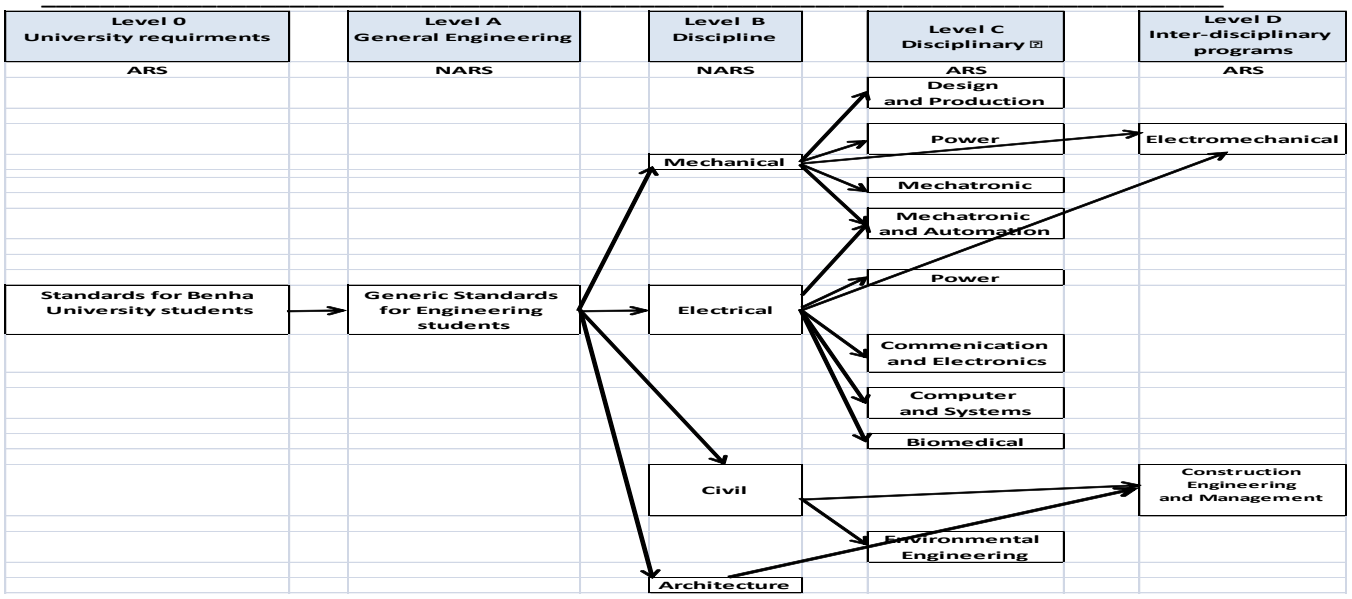


Figure 2 Different Levels of Competencies as per NARS 2018, as published by NAQAAE

ملخص البرامج الدراسية:

Table 11 List of overall data about the programs.

#	Program	NC	Credits and SWL			Total Contact Hours				4 Requirements %				BS %
			CH	ECTS	SWL	Lec	Tut	Lab	TT	UR	FR	DR	PR	
Specialized Programs														
1	Design and Production Engineering	**61**	160	267	6750	104	55	76	235	8.75	20	39.37	31.87	22.5
2	Mechanical Power Engineering	**61**	160	267	6750	106	55	74	235	8.75	20	41.25	30	18.75
3	Mechatronics Engineering Program	61	160	267	6750	104	55	76	235	8.75	20	39.375	31.875	22.5
4	Electrical Power and Machines Engineering	61	160	270	6750	110	102	73	285	8.75	20	41.87	29.4	18.125
5	Computer and Control Systems Engineering	58	160	270	6750	108	56	75	239	8.75	20	41.88	29.38	20.63
6	Electronics and Communications	58	160	270	6750	107	65	72	244	8.75	20	42.5	28.75	18.75
7	Biomedical Engineering	58	160	270	6750	108	89	97	294	8.75	20	41.7	29	18.75
8	Civil Engineering	62	160	270	6750	113	51	61	225	8.75	20	63.75	0	18.75
9	Architectural Engineering	**61**	160	267	6750	108	98	26	232	8.75	20	71.25	0	11.25
Interdisciplinary Programs														
10	Infrastructures and Utilities Engineering	62	160	267	6667	110	70	50	230	8.75	20	0	71.75	18.75
11	Construction Engineering and Management	62	160	267	6667	111	71	50	232	8.75	20	0	71.75	18.75
12	Elctromechanical Engineering	61	160	234	5850	113	82	31	226	9	20	0	71	21
13	Mechatronics and Automation Program	**61**	160	279.6	6990	106	56	71	233	8.75	27.5	0	63.75	22.5

NC	Total number of Courses	UR	University Requirement
CH	Credit Hour	FR	Faculty Requirement
ECTS	European Credit Transfer System	DR	Discipline Requirement
SWL	Student Workload	PR	Program Requirement
Lec	Lectures	TT	Total
Tut	Tutorials	BS	Basic Sciences Percentage
Lab	Laboratory		

Checklist for each program:

- The total number of credit hours should be between 144 and 165
- The percentage of the 4 requirements is calculated by credit hours and should follow the percentages in the Terms of Reference.
- The percentage of Basic Sciences is calculated by credit hours and should follow the percentages in the Terms of Reference.
- **The maximum number of courses is 60**
- The maximum number of weekly contact hours is 280 Contact Hours. The maximum number of Lecture Contact hours is 50% of total contact hours or 130 contact hours, whichever is less.

متطلبات الجامعة

تهتم جامعة بنها ببناء التفكير البشري ليكون في أعلى مستوياته ليكون مصدر مهم لتنمية الموارد البشرية، يهتم بالنهوض بالحضارة العربية و التراث التاريخي للمجتمع المصري وتقاليده. كما أنها تهتم بتعاليم الدين والأخلاق والقومية العربية. و من الأهمية بمكان الاهتمام بدراسة المشاكل المجتمعية المعاصرة و كيفية مواجهتها. لذلك يجب أن يكون خريج جامعة بنها مدرك تماما للقضايا الوطنية والإقليمية والدولية المعاصرة ، ليكون شخصية واعية و مؤهلة فكريا للتفاعل الفعال في المجتمع من خلال مختلف مهارات التواصل.

و لتحقيق هذا، صممت جامعة بنها عددًا من المقررات لبناء شخصية الطالب وتنمية مهاراته وتزيد من وعيه بالموضوعات المختلفة. هذه المقررات تسمى متطلبات الجامعة. اختارت كلية الهندسة ببنها بعض من هذه المقررات ضمن البرامج الهندسية. هذه المقررات تشتمل على:

جدول (11) قائمة مقررات متطلبات الجامعة

الكود	المقرر	الساعات المعتمدة	ساعات الإتصال			
			محاضرة	معمل	درس نظري	الإجمالي
UHS 101	لغة أجنبية	2	2	--	--	2
UHS 102	تكنولوجيا المعلومات و الإتصالات	2	2	--	--	2
UHS 103	القضايا المجتمعية	2	2	--	--	2
UHS 104	أخلاقيات المهنة	2	2	--	--	2
UHS XXX	مقرر إختياري 1	2	2	--	--	2
UHS XXX	مقرر إختياري 2	2	2	--	--	2
UHS XXX	مقرر إختياري 3	2	2	--	--	2
الإجمالي		14	14	--	--	14

Table 11 List of University Requirements Courses

Code	Course Title	Cr. Hrs.	Ct. Hr.			
			Lect.	Lab.	Tut.	Tot.
UHS 101	Foreign Language	2	2	0	0	2
UHS 102	Information and Communication Technology	2	2	0	0	2
UHS 103	Societal Issues	2	2	0	0	2
UHS 104	Professional Ethics	2	2	0	0	2
UHS XXX	Humanities Elective I	2	2	0	0	2
UHS XXX	Humanities Elective II	2	2	0	0	2
UHS XXX	Humanities Elective III	2	2	0	0	2
Total		14	14	0	0	14

جدول (12) قائمة المقررات الإختيارية لمتطلبات الجامعة

الكود	المقرر	الساعات المعتمدة	ساعات الإتصال			
			محاضرة	معمل	درس نظري	الإجمالي
مقررات ريادة الأعمال						
UHS 201	مبادىء ريادة الأعمال وإدارة المشروعات	2	2	--	--	2
UHS 203	إدارة الموارد البشرية	2	2	--	--	2
مقررات المهارات الشخصية والمكتسبة						
UHS 301	مهارات الإتصال والعرض	2	2	--	--	2
UHS 302	مهارات القيادة	2	2	--	--	2
مقررات البحث والتحليل العلمي						
UHS 801	مناهج البحث	2	2	--	--	2
UHS 803	مهارات التفكير	2	2	--	--	2

Table 12 List of Humanities Elective Courses

Humanities Elective	Code	Course Title	Cr. Hrs.
Entrepreneurship Courses	UHS 201	Principles of Entrepreneurship and Project Management	2
	UHS 203	Human Resources Management	2
Personal and acquired skills courses	UHS 301	Communication and Presentation Skills	2
	UHS 302	Leadership Skills	2
Scientific research and analysis courses	UHS 801	Research Methodologies	2
	UHS 803	Thinking Skills	2

University Requirements Compulsory Courses

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 101	Foreign Language	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	خصائص اللغة الانجليزية، أو الألمانية، أو الفرنسية، أو أي لغة أخري يتم إقرارها من قبل مجلس القسم العلمي واعتمادها من مجلس الكلية والجامعة، مراجعه قواعد اللغة، بعض قواعد الاسلوب والجمل الفعالة وخصائصها، التعرف على بعض الأخطاء الشائعة في كتابه الجملة الفنية، بناء الفقرات الاساسية: أنواع الفقرات، قراءة وتحليل مقتطفات من الكتب في مختلف الفروع لتنمية مهارات الاتصال. The characteristics of the foreign language (English, Deutsch, French, or any foreign language approved by the academic department council and both the faculty and university councils) - Revision of the language grammar – grammar style and effective sentences and their characteristics – Identification of common errors in writing technical sentences – Building basic paragraphs: types of paragraphs, reading and analysing of excerpts from books in varies disciplines to develop communication skills.									
References	EManuel Alvarez-Sandoval, “The Importance of Learning a Foreign Language in a Changing Society”, 2005, Universe										

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 102	Information and Communication Technology	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	مفاهيم ومصطلحات تكنولوجيا المعلومات، أنماط الاتصال في التعليم والتعلم، شبكة الانترنت والتعلم، نظم الوسائل المتعددة، قواعد البيانات، الواقع الافتراضي، الواقع المعزز، انترنت الأشياء، الروبوتات وتصنيفها، الذكاء الاصطناعي، البيانات الضخمة، الحوسبة السحابية. Concepts and terminologies of information technology – Communication styles in teaching and learning – The internet and learning – multimedia systems – databases – Virtual Reality – Augmented reality – Internet of Things – Robotics and its classification – Artificial Intelligence – Big data – Cloud Computing.										
References	ITL Limited ITL Education Solutions Limited, "Introduction to Information Technology", 2nd edition, 2012, Pearson Education, ISBN: 9789332525146 Floyd Fuller, Brain Larson, Lisa Bucki, Faithe Wempen, "Computers: Understanding Technology Comprehensive ", 6th edition, 2016, Kendall Hunt Publishing, ISBN-13 : 978-0763870089										

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 103	Societal Issues	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	توعية الطلاب بالعديد من القضايا الاجتماعية والبيئية والاقتصادية وغ ريه ا ي مصر مثل من القضايا المعاصرة ف قضايا الزيادة السكانية في مصر وأثره ا على الفرد والمجتمع، وقضايا مكافحة الفساد وأثره على الحقوق الاقتصادية والتنمية المستدامة، وقضايا حقوق الإنسان، وقضايا العنف ضد المرأة، وقضايا الصحة العامة والتلوث البيئي والتصحر وتغيير المناخ والمياه، قضايا الطاقة وغيرها من القضايا الهامة في مجتمعنا. The awareness of students on many social, environmental, economic, and other contemporary issues in Egypt such as issues of overpopulation in Egypt and its impact on the individual and society - issues of combatting venality and its impact on economic rights and sustainable development – human rights issues – issues of violence against women – public health issues – environmental pollution and desertification -Climate change, water and energy issues – Other important issues in our society.										
References	Enid Hill, "Discourses in Contemporary Egypt: Politics and Social Issues", 2000, American University in Cairo Press.										

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/ OE	Final
UHS 104	Professional Ethics	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	يقدم المقرر الخلفية اللازمة لمناقشة المواضيع الأساسية للأخلاقيات المهنية مع التركيز على الموضوعات الأخلاقية التي تواجه الخريجيين في مجال العمل. ويحتوي المقرر على التعريف بالمقومات العامة لأخلاقيات المهنة ومراعاة المصلحة العامة واللوائح والانظمة، الالتزامات تجاه المجتمع والحقوق والواجبات مع دراسة أمثلة من مجال عمل الخريج في كل كلية. The course offers the background necessary to discuss the core issues of professional ethics facing graduates in their field of work. The course contains the definition of the general ingredients of professional ethics, and taking into account the public interest, rules and regulations, obligation towards society, rights and duties, with a study of example from the graduate's field of work in each college.										
References	John Rowan & Samuel Zinaich, Jnr., "Ethics for the Professions", 1st edition, 2002, ISBN-13 : 978-0155069992										

University Requirements Elective Courses

Code	Course Title	Pre-req	CH	Ct. Hr.				Assessment			
				Lec.	Lab	Tut	Sum	SA	MT	PE/O E	Final
UHS 201	Principles of Entrepreneurship and Project Management	-	2	2	-	-	2	30	30	-	40
Course Content	مفاهيم في ريادة الأعمال، ريادة الأعمال والمنشآت الصغيرة، توليد الأفكار للمشاريع الريادية، الجامعة وريادة الأعمال فرص وتحديات، الخطة التسويقية، الخطة التشغيلية، الخطة المالية، كتابة خطة العمل، البيئة التكنولوجية للمشروع الريادي، بيئة الاعمال الخارجية للمشروعات الريادية، برامج دعم المشاريع الرائدة في الاقتصاد المصري، مهارات عرض المشروع الريادي، مقدمة في إدارة المشروعات، الهيكل التنظيمي للمشروعات، تقييم النجاح، التخطيط، قراءة البيانات، مخطط الشبكات، تحليل المسار الحرج للشبكات، تخصيص المصادر والقيود، إدارة التكلفة، إدارة المخاطر، قياس ومراقبة أداء المشروعات. Concepts in entrepreneurship – entrepreneurship and small enterprises – Idea generation of entrepreneurial projects – The university and entrepreneurship opportunities and challenges – Marketing plan – operational plan – financial plan – Writing the business plan – The technological environment for entrepreneurship projects – External business environment for pioneering projects – Egyptian economy programs to support leading projects – entrepreneurial project presentation skills – Introduction to project management – The organizational structure – Success assessment – Planning – data reading – network planning – critical path analysis of networks – resource allocation and constraints – cost management – risk management – measurement and control of project performance.										
References	• Alexander Osterwalder, Yves Pigneur, "Business model generation: A handbook for visionaries, game changers, and challengers", 1st edition, 2010, ISBN-13 : 978-0470876411 • Eric Ries, "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses", 1st edition, 2011, ISBN-13 : 978-0307887894 • https://designthinking.ideo.com/										

Code	Course Title	Pre-req	CH	Ct. Hr.				Assessment			
				Lec.	Lab	Tut	Sum	SA	MT	PE/OE	Final
UHS 203	Human Resources Management		2	2	-	-	2	30	30	-	40
Course Content	مفهوم إدارة الموارد البشرية، التطور التاريخي لإدارة الموارد البشرية، الوظائف الرئيسية لإدارة الموارد البشرية، التخطيط للموارد البشرية، الحصول على الموارد البشرية، تدريب وتطوير الموارد البشرية، تعويض الموارد البشرية، الحفاظ على الموارد البشرية واستدامتها. The concept of human resources management – The historical development of human resource management – the main jobs of human resource management – planning for human resources – obtaining human resources – training and developing human resources – compensation for human resources – maintaining and sustaining human resources.										
References	• Dessler, G., Chhinzer, N., & Gannon, G., « Management of human resources: The essentials", 5th ed., 2019, Pearson Education, ISBN: 9780134882963. • A. DeNisi, R. Griffin, HR, "Human Resource Management", 3rd edition, 2007, ISBN-13 : 978-0618794195										

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 301	Communication & Presentation Skills	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	مدخل عام الى الاتصال، اهمية الاتصال، ا نواع الاتصال، معوقات الاتصال، مهارات الاتصال، سمات واساليب العرض الفعال، الاتصال اللفظي: مهارات التحدث، الاتصال غير اللفظي، مهارات الحوار واستراتيجيات الاقناع، الاتصال في بيئة العمل، كتابة السيرة الذاتية والتقارير والرسائل الرسمية. A general introduction to communication, the importance of communication, types of communication, communication obstacles, communication skills, features and methods of effective presentation, verbal communication: speaking skills – non-verbal communication – dialogue skills and persuasion strategies – communication in the work environment – writing resume – writing formal reports and letters.										
References	Mike Markel; Stuart A. Selber, "Practical Strategies for Technical Communication", Macmillan Learning, 3rd edition, 2019 Mike Markel; Stuart Selber, "Technical Communication", Macmillan Learning, 13th edition, 2021										

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 302	Leadership Skills	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	يهدف المقرر الى تنمية المهارات القيادية والإدارية لدى الطلاب، وتنمية فرص التم ر ي لديهم، من خلال تعريفهم بسمات الشخصية القيادية والإدارية، وأهم طرق وأساليب التحول من التعبئة الى القيادة، وتعريفهم بأهم استراتيجيات التميز والتفاعل القيادي، اضافة الى تنمية بعض المهارات وأخلاقيات القيادة والإدارة المتعلقة بالتخطيط وإدارة الذات والأخرين، وطرق وأساليب اتخاذ القرارات الفعالة، وأساليب التحف ر ي، ومهارة قيادة التغيير، وأخلاقيات الإدارة والقيادة. The course aims to develop the students' leadership and management skills – Develop their opportunities for excellence, by introducing the leadership and administrative personality traits – The most important ways of transformation from mobility to leadership – The most important strategies of excellence and leadership interaction – developing some skills and ethics of leadership and management related to planning self and other management – Effective decision-making methods and techniques – motivational methods – the skill of change leadership – management and leadership ethics.									
References	Primal Leadership, "Unleashing the power of Emotional Intelligence", Daniel Goleman, Harvard Business Review Press										

Code	Course Name	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 801	Research Methodology	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	التفكير العلمي وخصائصه، تعريف البحث العلمي وخصائصه، خطوات البحث العلمي وتصميم أدوات البحث وضبطها واختيار العينات (اختيار موضوع البحث، تحديد مشكلة البحث وعوامل اختيارها، تحديد إطار البحث، تحديد منهج البحث، تحليل البيانات). أنواع الدراسات العلمية: الدراسات الاستطلاعية، الدراسات الوصفية، الدراسات التجريبية. مناهج وطرق البحث العلمي: المنهج الوصفي، المسح الاجتماعي، دراسة المضمون، تحليل المضمون، أنواع التصميمات التجريبية، الأساليب الوصفية، الأساليب الاستنتاجية. Scientific thinking and its specifications, definition of scientific research and its specifications, steps of scientific research and designing research tools and sample selection (choosing a research subject, defining the research problem and the principles of choice, setting the research frame and methodology and data analysis). Types of scientific studies: Descriptive, survey and experimental studies. Scientific research methods: Descriptive method, social screening, content study, content analysis, types of experimental designs, descriptive methods, analytical methods.									
References	Ann Sloan Devlin, "The Research Experience: Planning, Conducting and Reporting Research", SAGE, 2nd Edition, 2020 C.R. Kothari, "Research Methodology: Methods and Techniques", New Age, 2nd Edition, 2004, ISBN (13) : 978-81-224-2488-1										

Code	Course Title	Pre-req.	CH	Ct. Hr.				Assessment			
				Lec.	Lab.	Tut.	Sum	SA	MT	PE/OE	Final
UHS 803	Thinking Skills	-	2	2	-	-	2	30%	30%	-	40%
Course Contents	مفاهيم نظرية (الذاكرة -التفكير- الإبداع)، مدخل إلى تعليم مهارات التفكير، طبيعة التفكير (تعريفه – خصائصه – مستوياته)، أنواع التفكير (الإبداعي- الناقد- العلمي)، مهارات التفكير المعرفية، مهارات التفكير الميتا معرفية، أدوات قياس التفكير، أنماط التفكير المختلفة ومها راتها، الاستراتيجيات المستخدمة في تنمية مهارات التفكير، برامج تعليم مهارات التفكير، طرق تعليم مهارات التفكير. Theoretical concepts (memory – thinking – creativity), an introduction to teaching thinking skills, the nature of thinking (definition – characteristics – levels) types of thinking (creative – critical – scientific), cognitive thinking skills, metacognitive thinking skills, thinking measurement tools, different thinking patterns, and skills, strategies used to develop thinking skills, thinking skills programs, ways to teach thinking skills									
References	John Butterworth, Geoff Thwaites, "Thinking Skills: Critical Thinking and Problem Solving", 2nd edition, 2016, ISBN-13 : 978-1107606302										

Faculty Requirements for Desplinary Programs ***متطلبات الكلية***

All programs offered at Benha Faculty of Engineering, Benha University are Engineering Programs. The graduates have the opportunity of being Engineers and are registered in the Egyptian Engineering Syndicate.

According to the National Academic Reference Standards (NARS-2018), The Engineering Graduate must be able to (A-Level):

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. Develop and conduct appropriate experimentation and/or simulation, analyse and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

A6. Plan, supervise and monitor implementation of engineering projects.

A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

To achieve these Learning Outcomes, a set of courses has to be completed as a Faculty Requirement. These courses are divided into Basic Science Courses and Basic Engineering Courses.

Table 12 List of Faculty requirements courses.

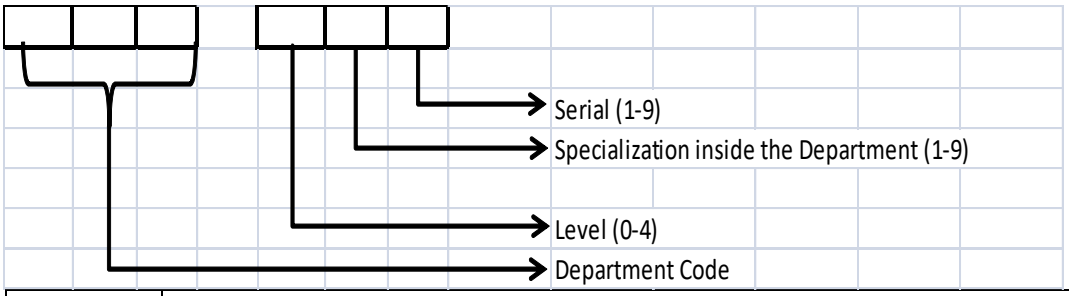
Code	Course	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
BES 011	Mathematics I	-----	3	2	0	2	4
BES 021	Mechanics I	-----	3	2	0	2	4
BES 031	Physics I	-----	3	2	2	1	5
BES 041	General Chemistry	-----	4	3	2	1	6
MEC 011	Engineering Graphics	-----	2	0	0	4	4
BES 012	Mathematics II	BES 011	3	2	0	2	4
BES 022	Mechanics II	BES 021	3	2	0	2	4
BES 032	Physics II	-----	3	2	2	1	5
MEC 012	Production Engineering	-----	2	1	3	0	4
MEC 014	Computer Aided Drafting	MEC 011	2	1	2	0	3
ELE 042	Computer Programming Fundamentals	-----	2	0	2	2	4
BES 141*	Pollution and Industrial Safety	BES 041	2	2	1	0	3
FTR 103	Field Training I	Completion of 65 Cr.Hrs	0	0	0	0	0
FTR 203	Field Training II	Completion of 96 Cr.Hrs	0	0	0	0	0
Total			32	19	14	17	50

* Course teaching is shared between the Basic Engineering Science Department and Displine Department.

Faculty Requirement Courses

The course coding is divided into two parts and follows the following convention:

1. Three Letters which are the Department code.
2. Three Numbers indicating the Level, the Specialization inside the department, and a counter inside the specialization.



BES x1x	Mathematics Courses offered by Basic Engineering Science Department
BES x2x	Mechanics Courses offered by Basic Engineering Science Department
BES x3x	Physics Courses offered by Basic Engineering Science Department
BES x4x	Chemistry Courses offered by Basic Engineering Science Department

MEC xxx	Course offered by Mechanical Engineering Department for Faculty Requirement
ELE xxx	Course offered by Electrical Engineering Department for Faculty Requirements

The following abbreviations are the legend for the courses:

CH Credit Hour
Ct. Hr. Contact Hour
Lec Lectures
Tut Tutorials
Lab Laboratory
Tot Total
MT Mid-Term Exam
SA Student Activity
PE Practical Exam

Code	Course Title	Pre-req	CH	Ct. Hrs.				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 011	Mathematics I	-	3	2	0	2	4	30	30	0	40
Course Content	**Differential Calculus:** Real functions and their graphs (Algebraic functions, trigonometric functions and their inverses, exponential, hyperbolic and logarithmic functions). Limits and continuity. Differentiation of real functions of one variable. Applications of differentiation (maxima, minima and inflection points, curve tracing, optimization problems). The first mean value theorem and first order approximation of functions. Taylor's and Maclaurin's expansions of functions. **Algebra:** Elements of mathematical logic with applications, Matrix algebra and systems of linear equations (Gauss elimination, Gauss – Jordan elimination, LU factorization, matrix inversion). Applications (codes, matrix games). Eigenvalues and eigenvectors. Complex numbers.										
References	• Howard Anton, "Calculus with analytical geometry", John Wiley & Sons, Last Edition. • Gilbert Strang, "Introduction to Linear Algebra", Wellesley-Cambridge Press, Last Edition.										

Code	Course Title	Pre-req	CH	Ct. Hrs				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 012	Mathematics II	BES 011	3	2	0	2	4	30	30	-	40
Course Content	**Integral Calculus:** Indefinite integrals with applications. Methods of integration. Definite integrals with applications (areas, volumes of revolution, lengths of curves and surface area). **Multivariable Calculus (A):** Surfaces and curves in three dimensions. Vector functions of one variable. Scalar functions of several variables, partial derivatives. Directional derivatives, total derivatives. Applications (tangent planes and normal lines. Taylor expansions, maxima and minima, Lagrange's multipliers).										
References	• Howard Anton, "Calculus with analytical geometry", John Wiley & Sons, Last Edition. • George B. Thomas, Jr., Maurice D. Weir, Joel Hass, THOMAS' CALCULUS Multivariable (Twelfth Edition), 2010. .										

Code	Course Title	Pre-req	CH	Ct. Hrs.				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 021	Mechanics I	-	3	2	-	2	4	30	30	-	40
Course Content	Fundamentals of statics, Types of supports, Vector algebra and applications to mechanics, Statics of particles, Moments of forces and couples, Equivalent systems of forces and moments. Equilibrium of rigid bodies, Centroides and centers of gravity, Analysis of structures (trusses and machines), Friction and its applications. Virtual Work for a System of Connected Rigid Bodies, Stability of Equilibrium Configuration.										
References	• F. P. Beer, E. R. Johnston, D. F. Mazurek, P. J. Cornwell, Vector Mechanics for Engineers: Statics and Dynamics, 10th edition (2013). • Hibbeler, R. C. Engineering Mechanics: Statics and Dynamics, 10th Edition. Upper Saddle River, New Jersey: Prentice Hall, (2003).										

Code	Course Title	Pre-req	CH	Ct Hrs				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 022	Mechanics II	BES 021	3	2	0	2	4	30	30	0	40
Course Content	Kinematics of particles (rectilinear and curvilinear motion), Kinetics of particles (force and acceleration method – work and energy method – impulse and momentum method), Planar Kinematics of rigid bodies (translation – rotation about a fixed axis – general plane motion), planar kinetics of rigid bodies (force and acceleration method – work and energy method. – impulse and momentum method). Moment of area, mass moments of inertia for single body, product of inertia and principal moments of inertia.										
References	• F. P. Beer, E. R. Johnston, D. F. Mazurek, P. J. Cornwell, Vector Mechanics for Engineers: Statics and Dynamics, 10th edition (2013). • Hibbeler, R. C. Engineering Mechanics: Statics and Dynamics, 10th Edition. Upper Saddle River, New Jersey: Prentice Hall, (2003).										

Code	Course Title	Pre-req	CH	Ct. Hrs.				Assessment			
BES 031	Physics I	-	3	Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
				2	2	1	5	10	30	20	40
Course Content	Wave motion, Sound waves, Doppler effect, Superposition of waves: interference, standing waves and beats, Interference of light waves, Diffraction of light, Polarization of light, First law of thermodynamics, Kinetic theory of gases, specific heats of gases, thermodynamic processes: isochoric, isobaric, isothermal and adiabatic, Heat transfer: conduction, convection and radiation, Elasticity, Hooke's law, Hydrostatics and surface tension, Hydrodynamics and Viscosity.										
References	• R. A. Serway and J. W. Jewett, Physics for scientists and engineers: Cengage learning, 2018. • Tarek M. Abdolkader, Mohamed Elfaham, Mina Asham, Ibrahim Sayed, Walid Selmy, *"Engineering Physics, Part I, Waves, Heat and Optics"*, 1st edition, 2022. • D. Halliday, et al., Fundamentals of physics: John Wiley & Sons, 2013. • D. Giancoli, Physics for Scientists & Engineers with Modern Physics, 4th Edition ed. Pearson, 2008.										
Laboratory	• Simple harmonic motion • Waves in stretched string, • Sound waves, • Interference and diffraction of light, • Polarization of light, • Specific heat, Thermistor and thermal conductivity.										

Code	Course Title	Pre-req	CH	Ct. Hrs				Assessment			
BES 032	Physics II	-	3	Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
				2	2	1	5	10	30	20	40
Course Content	Electric force and electric field, Motion of charge in electric field, Electric dipole, Gauss law and applications, Electric potential, Capacitors and dielectrics, Current and resistance, Magnetic field and magnetic force, Sources of magnetic field, Bio-Savart law and Ampere's laws, Electromagnetic induction and Faraday's law, Self-induction and magnetic energy.										
References	• R. A. Serway and J. W. Jewett, Physics for scientists and engineers: Cengage learning, 2018. • Tarek M. Abdolkader, Mohamed Elfaham, Mina Asham, Ibrahim Sayed, Walid Selmy, *"Engineering Physics, Part II, Waves, Heat and Optics"*, 1st edition, 2022. • D. Halliday, et al., Fundamentals of physics: John Wiley & Sons, 2013. • D. Giancoli, Physics for Scientists & Engineers with Modern Physics, 4th Edition ed. Pearson, 2008.										
Laboratory	• Ohm's Law • Wheatstone bridge & Metric bridge • Electric Field Mapping • Capacitor Charging and Discharging • The Electric Transformer • Faraday's Law										

Code	Course Title	Pre-req	CH	Ct. Hrs.				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 041	General Chemistry	-	4	3	2	1	6	10	30	20	40
Course Content	Gases: ideal & real gas laws, kinetic molecular theory- Liquids and solutions - Solids: arrangement of atoms, metallic solids, alloys - Chemical kinetics: reaction rates & order, catalysis – Electrochemistry: electrochemical cells, corrosion– Cements – Polymers – lubricants.										
References	- J. Brady, "General Chemistry, Principles and structures", Wiley Inc., Fifth Edition, 1990. - L. W. Fine, H. Beall, J. Stuehr, "Chemistry for Scientists and Engineering, Preliminary Edition, Brooks Cole; 1st edition, 1999. -Steven S. Zumdahl, "Chemistry Principles", Third Edition, Houghton Mifflin, 1998. -Prof. Elsayed Fouad, Engineering Chemistry I, II. -Steven S. Zumdahl, Susan A. Zumdahl "Chemistry" Seventh Edition, Houghton Mifflin, 2007. -P. Barnes, J. Bensted, Structure and Performance of Cements, CRC Press, 2nd Edition, 2019.										
Laboratory	-Neutralization Reactions -Oxidation-Reduction Reactions -W/C Ratio -Precipitation Reactions										

Code	Course Title	Pre-req	CH	Ct Hrs				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 141	Pollution and Industrial Safety	BES 041	2	2	1	-	3	10	30	20	40
Course Content	- Air pollution-sources and types of pollutants-Adverse effects -ozone depletion – green house effects- Acid rain and global warming -measurement and control methods. - Water pollution- sources and types- constituents of wastewater- primary treatment: various pre-treatment methods - Advanced Treatment: chemical oxidation, precipitation, air stripping, - heavy metals removal. **Civil and Architecture Engineering students:** Plan and manage construction health and safety, maintain safety issues for construction to introduce the foundations on which appropriate health and safety systems may be built. Occupation and health and safety affect all aspects of work. Legal framework for health and safety. **Mechanical Engineering students:** Hazards analysis-Hazards of pressure , uses of over pressure-hazards of temperature-HAZOP study regarding pressure, temperature & flow -static electricity & its control purging and inerting -relief valves and rupture disks-venting – flame arrester -flare system-alarms and types of alarms and its application-trips d interlock system-hot work permit , confined space vessel work permit & height work permit - personnel protective equipment-On-site &Off-site emergency plan. **Electrical Engineering students:** Electric shock and burns from live wire contact, Fires from faulty wiring, overloading circuits, leaving electrical parts exposed, Electrocution or burns from lack of PPE, Explosions and fires from explosive and flammable substances, Contact with overhead power lines Electrical exposure to water.										
References	• Handbook of "Industrial Safety and Health, Trade and Technical Press Ltd. Morden, U.K.1980. • S.P. Mahajan, "Pollution Control in Process Industries" Tata McGraw Hill, NewDelhi1985.										
Laboratory	• Air sampling • Water sampling • Adsorption • Precipitation										

Code	Course Title	Pre-req	CH	Ct. Hr.				Assessment Criteria			
				Lec.	Lab	Tut	Sum	SA	MT	PE/OE	Final
MEC 011	Engineering Graphics	-	2	0	0	4	4	30	30	-	40
Course Content	Engineering drawing techniques and skills. Conventional lettering and dimensioning. Geometric constructions. Theories of view derivation. Orthographic projection of engineering bodies. Derivation of views from isometric drawings and deducing of missing views. Sectioning views: (full, half, offset, partial, revolved, removed, and partial sectioning). Steel construction, Symbols of electrical circuits										
References	William Chalk, Goetsch, "Technical Drawing", Delmar technical graphics series, 6th edition, 2010. Allbert W. Boundy, "Engineering Drawing", McGraw-Hill Australia, 2012										
Laboratory	Student's engineering sketches and drawings carried out in the engineering drawing Labs.										

Code	Course Title	Pre-req	CH	Ct. Hr.				Assessment Criteria			
				Lec.	Lab	Tut	Sum	SA	MT	PE/OE	Final
MEC 012	Production Engineering	-	2	1	3	0	4	10	30	20	40
Course Content	Introduction, Types of industries, Casting processes: Main steps of sand casting, Pattern design, melting of metals, Cleaning and inspection of casting, Metal forming processes: Forging, Rolling, Extrusion, Drawing, Bending, Joining Processes: Temporary and permanent joints, welding techniques, Cutting Processes: Principles and elements of cutting processes, Basic cutting, and machining (Turning, Drilling, Milling, etc.,). Principles of production planning and control, Introduction to quality control.										
References	• Jiangshan Li, Semyon M. Meerkov, 2008, “Production Systems Engineering”, Springer; 1st ed. 2009 edition, 2008 • M. P. Groover, 2011, "Principles of Modern Manufacturing", 4th Ed., john Wiley & Sons, Inc.										
Laboratory	• Practicing the workshop measuring operations and tools • Practicing the sand-casting workshop • Practicing the welding workshop; electric arc welding, gas welding and cutting, and electric resistance welding • Practicing the machining workshop; turning, shaping, drilling, milling, and grinding • Practicing the metal forming workshop; rolling, bending, drawing, and extrusion • Practicing the carpentry workshop • Practicing the forging workshop										

Code	Course Title	Pre-req	CH	Ct. Hr.				Assessment Criteria			
				Lec.	Lab	Tut	Sum	SA	MT	PE/OE	Final
MEC 014	Computer Aided Drafting	MEC 011	2	1	2	0	3	10	30	20	40
Course Content	Introduction to Computer Aided Drafting, history, advantages, and limitation. Graphics/CAD involves the visualization, sketching, and geometric construction of mechanical components. Layout and creation 2D working industrial drawings that adhere to industry standards. Illustrate CAD drawing construction techniques, implementation of graphical communication through the use of the alphabet of lines, orthographic projection, section views, auxiliary views and the creation of assembly and detail mechanical components										
References	• William Chalk, Goetsch, "Technical Drawing", Delmar technical graphics series, 6th edition, 2010. • Allbert W. Boundy, "Engineering Drawing", McGraw-Hill Australia, 2012										
Laboratory	Student's engineering sketches and drawings carried out in the engineering Computer Labs										

Code	Course Name	Pre-req.	CH	Ct Hrs				Assessment			
				Lec.	Lab.	Tut.	Tot	SA	MT	PE/OE	Final
FTR 103	Field Training I	Completion of 65 CH	0	0	0	0	0	-	-	-	-
Course Contents	For 6 weeks interval as a minimum. Field training conducted under the supervision of a faculty member and field mentor in the actual field practice. The student must submit a detailed technical report by the end of training period, explain what he learned during this training. By the end of the training the student will be able to: Apply the principles knowledge to execute practical engineering field works. The students will have the opportunity to work with multidisciplinary teams during the training period.										

Code	Course Title	Pre-req	CH	Ct. Hr.				Assessment			
				Lec.	Lab	Tut	Sum	SA	MT	PE/OE	Final
ELE 042	Computer Programming Fundamentals	-	2	0	2	2	4	10	30	20	40
Course Content	Computer System: Hardware, Software - Introduction to software design - evolution and comparison of programming languages - types and characteristics of translators - Program Design Process - Software Life Cycle - structured programming - Variables, Constants - Input and Output - Data Types and Representation - Simple Flow - Flow of Control (Conditioning, Iteration) - Array - Functions (Predefined - Programmer Defined) - Pointers- Strings - program maintenance & testing – documentation. Course topics are explained using a high-level language (as C, or C++).										
References	• W. Savitch, "Problem Solving with C++", 10th Edition, Pearson, 2018, ISBN-13: 978-0134448282 • Jery Hanly, Elliot Koffman, “Problem Solving and Program Design in C”, 8th edition, Pearson, 2015, ISBN-13: 978-0134014890 • C.R. Severance, S. Blumenburg, "Python for Everybody: Exploring Data in Python 3", CreateSpace Independent Publishing Platform, 2016, ISBN-13: 978-1530051120 • R. Sedgweck, K. Wayne, "Introduction to Programming in Java: An Interdisciplinary Approach”, 2nd Edition, Addison-Wesley Professional, 2017, ISBN-13: 978-0672337840										
Laboratory	Problem solving labs using high level language (C, or C++) to apply explained topics in each lecture including: • Flowcharts • Data Types, Variable, Constant declaration. Input and Output • Sequence Flow program • Conditioning Statements (if, nested if and switch case) • Iteration Statements (for, while do while, Do Until, and nested loops) • Arrays (1D and 2D arrays) • Functions (predefined and user defined) • Pointers • Strings and string functions * Project: At the end of the course the student must provide a project emphasizing the course content										

Code	Course Name	Pre-req.	CH	Ct Hrs				Assessment			
				Lec.	Lab.	Tut.	Tot	SA	MT	PE/OE	Final
FTR 203	Field Training II	Completion of 96 CR	0	0	0	0	0	-	-	-	-
Course Contents	For 6 week interval as a minimum. Field training conducted under the supervision of a faculty member and field mentor in the actual field practice. The student must submit a detailed technical report by the end of training period, explain what he learned during this training. By the end of the training the student will be able to: Apply the principles knowledge to execute practical engineering field works. The students will have the opportunity to work with multidisciplinary teams during the training period.										

Program# 8 Civil Engineering Program

Program Description

Students completing the Civil Engineering program at Benha faculty of engineering are awarded with a Bachelor of Science in Civil Engineering degree. Civil Engineering Program provides the undergraduate education and the necessary skills required for a career as a civil engineer or to pursue graduate studies in relevant fields. Students awarded with Bachelor of Science in Civil Engineering can qualify and practice as Professional Civil Engineer (PE) after fulfilling the experience and exam requirements of the licensure. Our well-rounded curriculum emphasizes the fundamentals that integrate both established and cutting-edge civil engineering principles, methods, tools, and materials. The engineering courses are designed around real-life examples in connection with the practices in the industry so that students can easily relate the theories with practice. The humanity courses at Benha faculty of engineering helps our students to supplement their engineering education and training with communication skills, ethic values, and social and environmental awareness. The small class sizes within the Engineering Program allows student-centric and individualized learning environment.

Basic Information

Program Vision

The Civil Engineering Program strives to graduate qualified engineers, produce recognized research, and provide professional societal service locally and internationally.

Program Mission

The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.

Program Objectives

The objectives of the Civil Engineering Program are to enable its graduates to:

- **PO1.** Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life situation.
- **PO2.** Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.
- **PO3.** Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.
- **PO4.** Use techniques, skills, and modern engineering tools necessary for engineering practice.
- **PO5.** Master self-learning and life-long learning strategies to communicate effectively in academic/professional fields.
- **PO6.** Design of constructions that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural, and societal considerations.
- **PO7.** Incorporate economics and business practices including project risk and change management into the practice of engineering and to understand their limitations.

Graduates Attributes

According to NARS 2018 the graduate attributes of civil engineering are:

GA1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.

GA2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.

GA3. Behave professionally and adhere to engineering ethics and standards.

GA4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.

GA5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;

GA6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles.

GA7. Use techniques, skills and modern engineering tools necessary for engineering practice.

GA8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.

GA9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.

GA10. Demonstrate leadership qualities, business administration and entrepreneurial skills.

In addition to all engineering graduate attributes defined by NARS 2018, Civil Engineering graduates should be able to:

GA11. Design of constructions systems that meet specified needs with applicable standards.

GA12. Understand the concept of quality control during design and construction, field verification, and review

GA13. Incorporate economic and business practices into engineering projects.

Program Learning Outcomes

According to NARS 2018 the graduate of civil engineering program must be able to:

Level A: General Competencies of Engineering Graduate

PLO1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.

PLO2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

PLO3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

PLO4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.

PLO5. Practice research techniques and methods of investigation as an inherent part of learning.

PLO6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.

PLO7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

PLO8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

PLO9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

PLO10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.

Level B: Competencies of Civil Engineering Graduate

PLO11. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics, Hydrology and Fluid Mechanics.

PLO12. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors; or any other emerging field relevant to the discipline.

PLO13. Plan and manage construction processes; address construction defects, instability and quality issues; maintain safety measures in construction and materials; and assess environmental impacts of projects.

PLO14. Deal with biddings, contracts and financial issues including project insurance and guarantees.

Faculty Mission vs. Program Mission Matrix

Faculty Mission		Program Mission		
		The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.		
		The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools.	The program focuses on professional practices in civil engineering preparing its graduates for the labor market	Develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership.
Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market, and capable of using and developing modern technology, and providing research in engineering fields to serve society and community.	Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market		√	
	Capable of using and developing modern technology	√		
	Providing research in engineering fields to serve society and community			√

Program Mission vs. Program Objectives Matrix

Program Mission		Program Objectives						
		PO1	PO2	PO3	PO4	PO5	PO6	PO7
The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.	The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools.	√			√			√
	The program focuses on professional practices in civil engineering preparing its graduates for the labor market		√	√		√	√	
	Develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership.		√	√		√		

Program Objectives vs. Program Competencies Matrix

Program Objectives	Program Competencies													
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4
PO1	√	√							√					
PO2			√				√							
PO3							√	√	√					
PO4				√				√		√				
PO5					√			√		√				
PO6						√					√	√	√	
PO7			√						√					√

Program Objectives vs. Graduate Attributes Matrix

Program Objectives	Graduate Attributes												
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13
PO1	√	√											
PO2			√		√	√							
PO3				√						√			
PO4							√						
PO5								√	√				
PO6											√	√	
PO7													√

Career Prospects

Graduates of the Civil Engineering Program would apply their knowledge and interpersonal skills in careers, both in private and public sectors, to conceive, plan, design, implement, operate and maintain the systems needed to support the physical infrastructure.

Building, construction and maintenance will always be necessary for every country. Civil Engineers with computer skills will be particularly in demand because of the growing usage of computers in areas such as structural analysis and design, transportation system planning and construction management.

Graduates will be able to pursue a variety of career options in worldwide locations due to demands for improvements to civil infrastructure that are ever-present, because of population growth and deterioration of existing systems over time. Several career options include, but not limited to, the following:

1. Survey Engineering
2. Geotechnical Engineering
3. Structural Engineering
4. Hydraulics and Irrigation Engineering
5. Environmental Engineering
6. Transportation, Traffic and Highway Engineering
7. Construction Management Engineering

Requirements of Program Courses

Program Requirements

Requirement		Cr. Hrs.	Ct. Hr.			
			Lec	Lab	Tut	Sum
Benha University Requirements		14	14	0	0	14
Benha Faculty of Engineering Requirements		32	19	14	17	50
Program Requirements	From Basic science	12	8	6	2	16
	Compulsory Courses	84	60	37	24	121
	Elective courses	18	12	4	8	24
Total		160	113	61	51	225

University Requirements of Civil Engineering Program

Lists of Humanities Courses of Civil Engineering Program

Code	Course	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
UHS 101	Foreign Language	-----	2	2	0	0	2
UHS 102	Information and Communication Technology	-----	2	2	0	0	2
UHS 103	Societal Issues	-----	2	2	0	0	2
UHS 104	Professional Ethics	-----	2	2	0	0	2
UHS XXX	Humanities Elective I	-----	2	2	0	0	2
UHS XXX	Humanities Elective II	-----	2	2	0	0	2
UHS XXX	Humanities Elective III	-----	2	2	0	0	2
Total			14	14	0	0	14

Lists of Electives Humanities Courses of Civil Engineering Program

Humanities Elective		Code	Course
I	Entrepreneurship Courses	UHS 201	Principles of Entrepreneurship and Project Management
		UHS 203	Human Resources Management
II	Personal and acquired skills courses	UHS 301	Communication and Presentation Skills
		UHS 302	Leadership Skills
III	Scientific research and analysis courses	UHS 801	Research Methodologies
		UHS 803	Thinking Skills

Basic Science Requirements of Civil Engineering Program

CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
BES 011	Mathematics I	-----	3	2	0	2	4
BES 012	Mathematics II	BES 011	3	2	0	2	4
BES 111	Differential Equations	BES 012	3	2	0	2	4
BES 112	Numerical Analysis	BES 111	3	2	2	0	4
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4
BES 041	General Chemistry	-----	4	3	2	1	6
BES 148	Water Chemistry	BES 041	3	2	2	0	4
BES 141*	Pollution and Industrial Safety	BES 041	2	2	1	0	3
BES 031	Physics I	-----	3	2	2	1	5
BES 032	Physics II	-----	3	2	2	1	5
Total			30	21	13	9	43

* Course teaching is shared between the Basic Engineering Science Department and Civil Engineering Department.

Program Requirements

Lists of Compulsory Courses (96 Cr. Hrs.)

CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
BES 111	Differential Equations	BES 012	3	2	0	2	4
BES 112	Numerical Analysis	BES 111	3	2	2	0	4
BES 148	Water Chemistry	BES 041	3	2	2	0	4
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4
Total from Basic Science			12	8	6	2	16
CIV 101	CAD for Civil Engineering	MEC 014	2	1	3	0	4
CIV 111	Properties and Testing of Materials	BES 022	3	2	2	0	4
CIV 113	Technology of Building Materials	BES 041	2	2	1	0	3
CIV 114	Concrete Technology	CIV 113	3	2	2	0	4
CIV 121	Structure Analysis I	BES 021	3	2	0	2	4
CIV 122	Structure Analysis II	CIV 121	3	2	0	2	4
CIV 142	Surveying for Engineers I	BES 012	3	2	2	0	4
CIV 161	Fluid Mechanics	BES 031	2	2	1	0	3
CIV 162	Hydraulics	CIV 161	2	2	1	0	3
ARC 217	Architectural Engineering	CIV 101	2	1	0	2	3
CIV 221	Structure Analysis III	CIV 122	3	2	0	2	4
CIV 222	Design of Metallic Structures I	CIV 122	3	2	0	2	4
CIV 231	Soil Mechanics	CIV 111	3	2	2	0	4
CIV 232	Geotechnical Engineering and Foundations	CIV 231, CIV 251	3	2	2	0	4
CIV 241	Surveying for Engineers II	CIV 142	3	2	2	0	4
CIV 251	Design of R.C. Structures I	CIV 114, CIV 122	3	2	0	2	4
CIV 252	Design of R.C. Structures II	CIV 251	3	2	0	2	4
CIV 261	Hydrology	CIV 162	2	2	0	1	3
CIV 272	Water Supply Engineering	CIV 162	3	2	2	0	4
CIV 282	Traffic and Transportation Engineering	BES 112, BES 211	3	2	2	0	4
CIV 300	Contracts and Legalizations	CIV 222, CIV 252	2	2	0	1	3
CIV 302	Computer Applications in Civil Engineering	ELE 042, CIV 122	2	1	3	0	4
CIV 304	Quality Control and Fundamentals of Repair and Strengthening of Structures	CIV 252, CIV 321	2	2	0	1	3
CIV 306	Engineering Economy	-----	2	2	0	1	3
CIV 321	Design of Metallic Structures II	CIV 222	3	2	0	2	4
CIV 331	Design of Foundations and Earth Retaining Structures	CIV 232	2	2	0	1	3
CIV 351	Design of R.C. Structures III	CIV 252	2	2	0	1	3
CIV 361	Irrigation and Drainage Engineering	CIV 161	2	2	0	1	3
CIV 371	Sanitary Engineering	CIV 272	3	2	2	0	4
CIV 381	Highway Engineering I	CIV 142, CIV 231, CIV 282	3	2	2	0	4
CIV 398	Senior Design Project I	*	2	0	4	0	4
CIV 401	Construction Project & Management	CIV 300	2	2	0	1	3
CIV 499	Senior Design Project II	CIV 398	3	1	4	0	5
Total from Civil Courses			84	60	37	24	121
Total			96	68	43	26	137

* The student can register the senior design project course after passing 70% of the program Cr. Hrs., i.e., 112 Cr. Hrs. + completion of the prerequisite courses of the project.

Lists of Elective Courses (18 Cr. Hrs.)

CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
Elective I							
CIV 200	Civil Engineering Application I	Completion of 70 Cr. Hrs.	3	2	2	0	4
CIV 202	Civil Engineering Application II		3	2	2	0	4
Elective II							
CIV 312	Modern Construction Materials	CIV 114	3	2	0	2	4
CIV 322	Structure Analysis IV	CIV 221	3	2	0	2	4
CIV 332	Special Topics in Geotechnical Engineering	CIV 331	3	2	0	2	4
CIV 342	Satellite Geodesy	CIV 241	3	2	0	2	4
CIV 344	Underground Utility Survey	CIV 241	3	2	0	2	4
CIV 346	Hydrographic Survey	CIV 241	3	2	0	2	4
Elective III							
CIV 324	Metallic Structures Design III	CIV 222	3	2	0	2	4
CIV 334	Special Topics in Foundations Engineering	CIV 331	3	2	0	2	4
CIV 352	R.C. Structures Design IV	CIV 351	3	2	0	2	4
CIV 362	Design of Irrigation Structure	CIV 162	3	2	0	2	4
CIV 364	Costal Engineering	CIV 162	3	2	0	2	4
CIV 372	Advanced Sanitary Engineering	CIV 371	3	2	0	2	4
CIV 382	Airport Engineering	CIV 381	3	2	0	2	4
CIV 384	Railway Engineering	CIV 282	3	2	0	2	4
Elective IV							
CIV 403	Construction project specifications, bids, and contracts	CIV 300	3	2	0	2	4
CIV 405	Value Engineering in the Construction Industry	CIV 300	3	2	0	2	4
Elective V							
CIV 407	Repair and Strengthening of Concrete Structures	CIV 304	3	2	0	2	4
CIV 461	Inland Navigation	CIV 162	3	2	0	2	4
CIV 471	Environmental Engineering	-----	3	2	0	2	4
CIV 481	Highway Engineering II	CIV 381	3	2	0	2	4
Elective VI							
CIV 421	Modelling of structures	CIV 322	3	2	2	0	4
CIV 431	Computer Application in Geotechnical Engineering and Foundations	CIV 331	3	2	2	0	4
CIV 441	Remote Sensing and Geographical Information Systems	CIV 241	3	2	2	0	4
CIV 443	Photogrammetry by Drones	CIV 241	3	2	2	0	4
CIV 451	R.C. structures Modelling	CIV 352	3	2	2	0	4
CIV 463	Hydraulic Modelling	CIV 162	3	2	2	0	4
CIV 473	Modeling of Water & Wastewater Networks	CIV 371	3	2	2	0	4
CIV 483	Computer Application in Transportation Engineering	CIV 381	3	2	2	0	4
Total			18	12	4	8	24

Proposed Study Plan

Level 0-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS 101	Foreign Language	-----	2	2	0	0	2	2	30	30	0	40	100
UHS 102	Information and Communication Technology	-----	2	2	0	0	2	2	30	30	0	40	100
MEC 011	Engineering Graphics	-----	2	0	0	4	4	2	30	30	0	40	100
BES 011	Mathematics I	-----	3	2	0	2	4	2	30	30	0	40	100
BES 021	Mechanics I	-----	3	2	0	2	4	2	30	30	0	40	100
BES 031	Physics I	-----	3	2	2	1	5	2	10	30	20	40	100
BES 041	General Chemistry	-----	4	3	2	1	6	2	10	30	20	40	100
Sum			19	13	4	10	27						700

Level 0-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS 103	Societal Issues	-----	2	2	0	0	2	2	30	30	0	40	100
MEC 012	Production Engineering	-----	2	1	3	0	4	2	30	30	0	40	100
MEC 014	Computer Aided Drafting	MEC 011	2	1	2	0	3	2	30	30	0	40	100
BES 012	Mathematics II	BES 011	3	2	0	2	4	2	30	30	0	40	100
BES 022	Mechanics II	BES 021	3	2	0	2	4	2	30	30	0	40	100
BES 032	Physics II	-----	3	2	2	1	5	2	10	30	20	40	100
ELE 042	Computer Programming Fundamentals	-----	2	0	2	2	4	2	10	30	20	40	100
Sum			17	10	9	7	26						700

Level 1-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
BES 141	Pollution and Industrial Safety	BES 041	2	2	1	0	3	2	10	30	20	40	100
BES 111	Differential Equations	BES 012	3	2	0	2	4	2	30	30	0	40	100
CIV 101	CAD for Civil Engineering	MEC 014	2	1	3	0	4	2	30	30	0	40	100
CIV 111	Properties and Testing of Materials	BES 022	3	2	2	0	4	2	10	30	20	40	100
CIV 113	Technology of Building Materials	BES 041	2	2	1	0	3	2	10	30	20	40	100
CIV 121	Structure Analysis I	BES 021	3	2	0	2	4	2	30	30	0	40	100
CIV 161	Fluid Mechanics	BES 031	2	2	1	0	3	2	10	30	20	40	100
Sum			17	13	8	4	25						700

Level 1-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS 104	Professional Ethics	-----	2	2	0	0	2	2	30	30	0	40	100
BES 112	Numerical Analysis	BES 111	3	2	2	0	4	2	10	30	20	40	100
BES 148	Water Chemistry	BES 041	3	2	2	0	4	2	10	30	20	40	100
CIV 114	Concrete Technology	CIV 113	3	2	2	0	4	2	10	30	20	40	100
CIV 122	Structure Analysis II	CIV 121	3	2	0	2	4	2	30	30	0	40	100
CIV 142	Surveying for Engineers I	BES 012	3	2	2	0	4	2	10	30	20	40	100
CIV 162	Hydraulics	CIV 161	2	2	1	0	3	2	10	30	20	40	100
Sum			19	14	9	2	25						700

Field Training I													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
FTR 103	Field Training I	Completion of 65 Cr. Hrs.	0	0	0	0	0	Oral	-	-	Pass or fail	-	-

Level 2-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4	2	10	30	20	40	100
ARC 217	Architectural Engineering	CIV 101	2	1	0	2	3	2	30	30	0	40	100
CIV 221	Structure Analysis III	CIV 122	3	2	0	2	4	2	30	30	0	40	100
CIV 231	Soil Mechanics	CIV 111	3	2	2	0	4	2	10	30	20	40	100
CIV 241	Surveying for Engineers II	CIV 142	3	2	2	0	4	2	10	30	20	40	100
CIV 251	Design of R.C. Structures I	CIV 114, CIV 122	3	2	0	2	4	2	30	30	0	40	100
CIV 261	Hydrology	CIV 162	2	2	0	1	3	2	30	30	0	40	100
Sum			19	13	6	7	26						700

Level 2-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
CIV 2XX	Elective I	*	3	2	0	2	4	2	30	30	0	40	100
CIV 222	Design of Metallic Structures I	CIV 122	3	2	0	2	4	2	30	30	0	40	100
CIV 232	Geotechnical Engineering and Foundations	CIV 231, CIV 251	3	2	2	0	4	2	10	30	20	40	100
CIV 252	Design of R.C. Structures II	CIV 251	3	2	0	2	4	2	30	30	0	40	100
CIV 272	Water Supply Engineering	CIV 162	3	2	2	0	4	2	10	30	20	40	100
CIV 282	Traffic and Transportation Engineering	BES 112, BES 211	3	2	2	0	4	2	10	30	20	40	100
Sum			18	12	6	6	24						600

* According to the Course Name

Field Training II													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
FTR 203	Field Training II	Completion of 96 Cr. Hrs.	0	0	0	0	0	Oral	-	-	Pass or Fail	-	-

Level 3-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS XXX	Humanities Elective I	-----	2	2	0	0	2	2	30	30	0	40	100
CIV 321	Design of Metallic Structures II	CIV 222	3	2	0	2	4	2	30	30	0	40	100
CIV 331	Design of Foundations and Earth Retaining Structures	CIV 232	2	2	0	1	3	2	30	30	0	40	100
CIV 351	Design of R.C. Structures III	CIV 252	2	2	0	1	3	2	30	30	0	40	100
CIV 361	Irrigation and Drainage Engineering	CIV 161	2	2	0	1	3	2	30	30	0	40	100
CIV 371	Sanitary Engineering	CIV 272	3	2	2	0	4	2	10	30	20	40	100
CIV 381	Highway Engineering I	CIV 142 CIV 231 CIV 282	3	2	2	0	4	2	10	30	20	40	100
Sum			17	14	4	5	23						700

Level 3-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
CIV 300	Contracts and Legalizations	CIV 222 CIV 252	2	2	0	1	3	2	30	30	0	40	100
CIV 302	Computer Applications in Civil Engineering	ELE 042 CIV 122	2	1	3	0	4	2	30	30	0	40	100
CIV 304	Quality Control and Fundamentals of Repair and Strengthening of Structures	CIV 252 CIV 321	2	2	0	1	3	2	30	30	0	40	100
CIV 306	Engineering Economy	-----	2	2	0	1	3	2	30	30	0	40	100
CIV 3XX	Elective II	*	3	2	0	2	4	2	30	30	0	40	100
CIV 3XX	Elective III	*	3	2	0	2	4	2	30	30	0	40	100
CIV 398	Senior Design Project I	**	2	0	4	0	4	Oral	50	0	0	50	100
Sum			16	11	7	7	25						700

* According to the Course Name

** The student can register the senior design project course after passing 70% of the program cr. hrs, i.e., 112 Cr. Hrs. + completion of the prerequisite courses of the project.

Level 4-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS XXX	Humanities Elective II	-----	2	2	0	0	2	2	30	30	0	40	100
UHS XXX	Humanities Elective III	-----	2	2	0	0	2	2	30	30	0	40	100
CIV 401	Construction Project & Management	CIV 300	2	2	0	1	3	2	30	30	0	40	100
CIV 4XX	Elective IV	*	3	2	0	2	4	2	30	30	0	40	100
CIV 4XX	Elective V	*	3	2	0	2	4	2	30	30	0	40	100
CIV 4XX	Elective VI	*	3	2	0	2	4	2	30	30	0	40	100
CIV 499	Senior Design Project II	CIV 398	3	1	4	0	5	Oral	50	0	0	50	100
Sum			18	13	4	7	24						700

* According to the Course Name

Matching Civil Engineering Program Courses with ABET Requirements

ABET Program Criteria for Civil and Similarly Named Engineering Programs
Lead Society: American Society of Civil Engineers

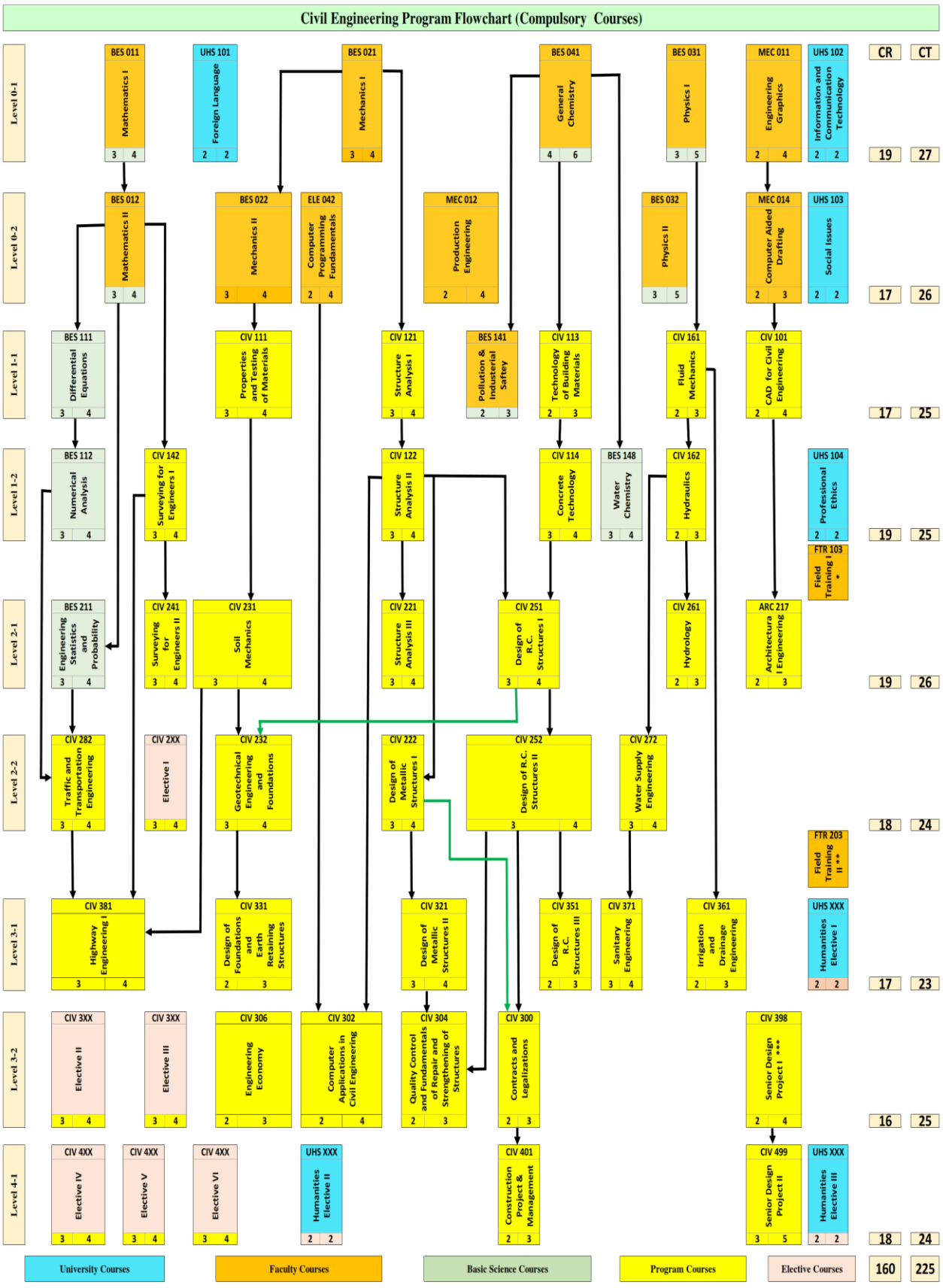
Civil Engineering Program Courses Required to Cover ABET Criteria				
ABET Criteria		**CODE**	**Course Name**	**Cr. Hrs.**
A minimum of 30 semester credit hours (or equivalent) of a combination of college-level mathematics and basic sciences with experimental experience appropriate to the program.	The curriculum must prepare graduates to apply knowledge of mathematics through differential equations.	BES 011	Mathematics I	3
		BES 012	Mathematics II	3
		BES 111	Differential Equations	3
	At least one additional area of basic science; apply probability and statistics to address uncertainty	BES 112	Numerical Analysis	3
		BES 211	Engineering Statistics and Probability	3
	Chemistry	BES 041	General Chemistry	4
		BES 249	Water Chemistry	3
		BES 141	Pollution and Industrial Safety	2
	Calculus-based physics	BES 031	Physics I	3
		BES 032	Physics II	3
Total				**30**
ABET Criteria		**CODE**	**Course Name**	**Cr. Hrs.**
A minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design and utilizing modern engineering tools.	Analyze and solve problems in at least four technical areas appropriate to civil engineering.	CIV 121	Structure Analysis I	3
		CIV 122	Structure Analysis II	3
		CIV 221	Structure Analysis III	3
		CIV 261	Hydrology	2
		CIV 361	Irrigation and Drainage Engineering	2
		CIV 302	Computer Applications in Civil Engineering	2
		CIV 282	Traffic and Transportation Engineering	3
	Conduct experiments in at least two technical areas of civil engineering and analyze and interpret the resulting data.	CIV 111	Properties and Testing of Materials	3
		CIV 113	Technology of Building Materials	2
		CIV 114	Concrete Technology	3
		CIV 142	Surveying for Engineers I	3
		CIV 241	Surveying for Engineers II	3
		CIV 231	Soil Mechanics	3
		CIV 232	Geotechnical Engineering and	3

			Foundations	
		CIV 161	Fluid Mechanics	2
		CIV 162	Hydraulics	2
	Design a system, component, or process in at least two civil engineering contexts;	CIV 331	Design of Foundations and Earth Retaining Structures	3
		CIV 251	Design of R.C. Structures I	3
		CIV 252	Design of R.C. Structures II	3
		CIV 351	Design of R.C. Structures III	3
		CIV 222	Design of Metallic Structures I	3
		CIV 321	Design of Metallic Structures II	3
		CIV 381	Highway Engineering I	3
		CIV 272	Water Supply Engineering	3
		CIV 371	Sanitary Engineering	3
	Include principles of sustainability in design.	CIV 304	Quality Control and Fundamentals of Repair and Strengthening of Structures	2
		CIV 4XX	Elective V	3
	Explain basic concepts in project management, business, public policy, and leadership.	CIV 300	Contracts and Legalizations	2
		CIV 306	Engineering Economy	2
		CIV 401	Construction Project & Management	2
		CIV 4XX	Elective IV	3
		UHS 103	Societal Issues	2
		UHS XXX	Humanities Elective I	2
		UHS XXX	Humanities Elective II	2
	Analyze issues in professional ethics and explain the importance of professional licensure.	UHS 104	Professional Ethics	2
Total				**91**

Courses Plan and Matrix

Civil Engineering Program Map

								CR	CT
Level 0	UHS 101 Foreign Language 2 2	UHS 102 Information and Communication Technology 2 2	MEC 011 Engineering Graphics 2 4	BES 011 Mathematics I 3 4	BES 021 Mechanics I 3 4	BES 031 Physics I 3 5	BES 041 General Chemistry 4 6	19	27
	UHS 103 Social Issues 2 2	MEC 012 Production Engineering 2 4	MEC 014 Computer Aided Drafting 2 3	BES 012 Mathematics II 3 4	BES 022 Mechanics II 3 4	BES 032 Physics II 3 5	ELE 042 Computer Programming Fundamentals 2 4	17	26
Level 1	BES 141 Pollution & Industrial Safety 2 3	BES 111 Differential Equations 3 4	CIV 101 CAD for Civil Engineering 2 4	CIV 111 Properties and Testing of Materials 3 4	CIV 113 Technology of Building Materials 2 3	CIV 121 Structure Analysis I 3 4	CIV 161 Fluid Mechanics 2 3	17	25
	UHS 104 Professional Ethics 2 2	BES 112 Numerical Analysis 3 4	BES 148 Water Chemistry 3 4	CIV 114 Concrete Technology 3 4	CIV 122 Structure Analysis II 3 4	CIV 142 Surveying for Engineers I 3 4	CIV 162 Hydraulics 2 3	19	25
	FTR 103 Field Training I								
Level 2	BES 211 Engineering Statistics and Probability 3 4	ARC 217 Architectural Engineering 2 3	CIV 221 Structure Analysis III 3 4	CIV 231 Soil Mechanics 3 4	CIV 241 Surveying for Engineers II 3 4	CIV 251 Design of R.C. Structures I 3 4	CIV 261 Hydrology 2 3	19	26
	CIV 2XX Elective I 3 4	CIV 222 Design of Metallic Structures I 3 4	CIV 232 Geotechnical Engineering and Foundations 3 4	CIV 252 Design of R.C. Structures II 3 4	CIV 272 Water Supply Engineering 3 4	CIV 282 Traffic and Transportation Engineering 3 4		18	24
	FTR 203 Field Training II								
Level 3	UHS XXX Humanities Elective I 2 2	CIV 321 Design of Metallic Structures II 3 4	CIV 331 Design of Foundations and Earth Retaining Structures 2 3	CIV 351 Design of R.C. Structures III 2 3	CIV 361 Irrigation and Drainage Engineering 2 3	CIV 371 Sanitary Engineering 3 4	CIV 381 Highway Engineering I 3 4	17	23
	CIV 300 Contracts and Legalizations 2 3	CIV 302 Computer Applications in Civil Engineering 2 4	CIV 304 Quality Control and Fundamentals of Repair and Strengthening of Structures 2 3	CIV 306 Engineering Economy 2 3	CIV 3XX Elective II 3 4	CIV 3XX Elective III 3 4	CIV 398 Senior Design Project I 2 4	16	25
Level 4	UHS XXX Humanities Elective II 2 2	UHS XXX Humanities Elective III 2 2	CIV 401 Construction Engineering & Management 2 3	CIV 4XX Elective IV 3 4	CIV 4XX Elective V 3 4	CIV 4XX Elective VI 3 4	CIV 499 Senior Design Project II 3 5	18	24
	University Req.	Faculty Req.	Basic Science Req.	Program Req.	Elective Req.	CR : Crediet Hour CT : Contact Hour		CR 160	CT 225



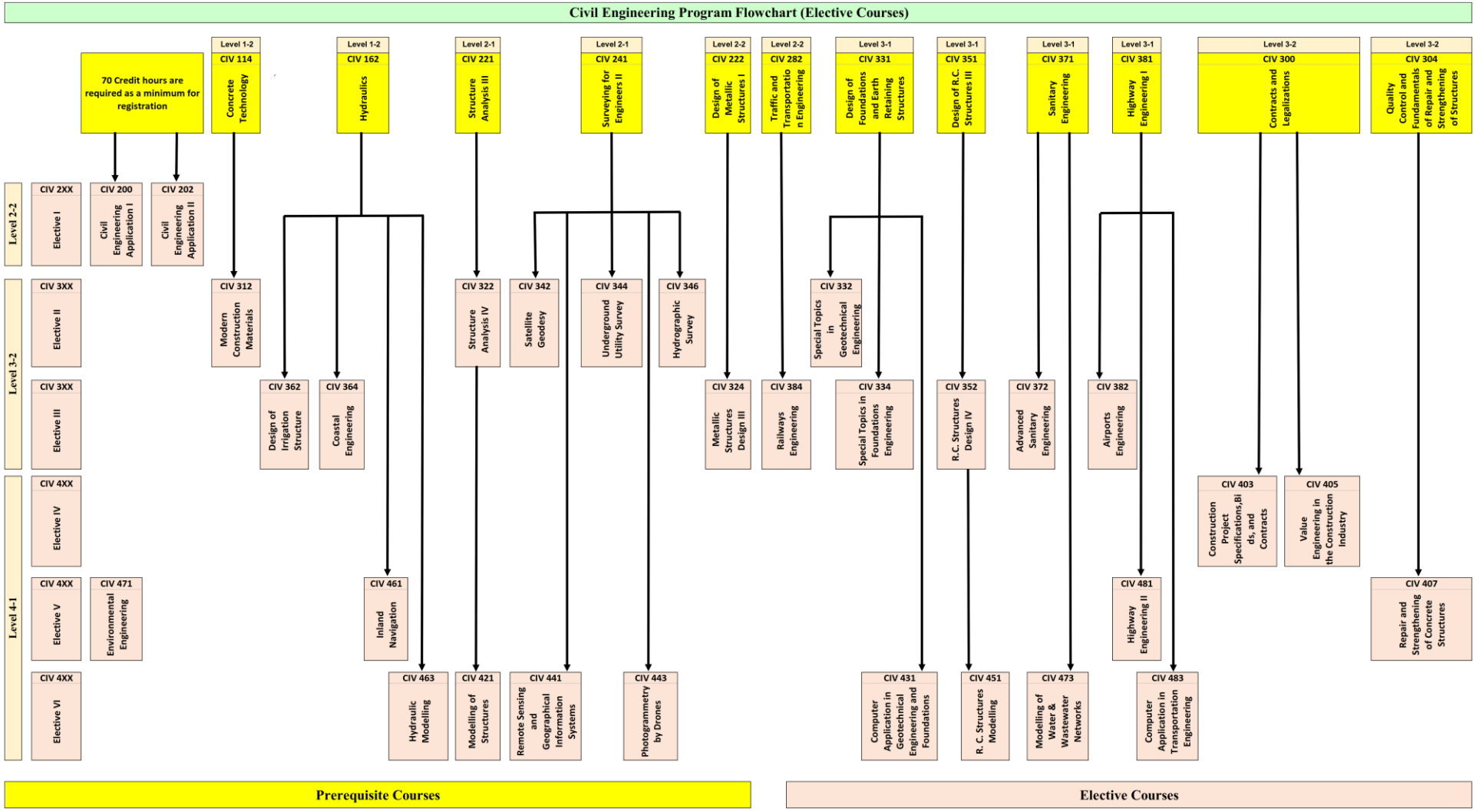
* 65 Credit hours are required as a minimum for registration.

** 96 Credit hours are required as a minimum for registration

*** The student can register the senior design project course after passing 70% of the program Credit hours, i.e., 112 credit hours + completion of the prerequisite courses of the project.

Civil Engineering Program - Elective Courses

Level 2	CIV 2XX Elective I 3 4	→ CIV 200 Civil Engineering Application I 3 4	CIV 202 Civil Engineering Application II 3 4						
Level 3	CIV 3XX Elective II 3 4	→ CIV 312 Modern Construction Materials 3 4	CIV 322 Structure Analysis IV 3 4	CIV 332 Special Topics in Geotechnical Engineering 3 4	CIV 342 Satellite Geodesy 3 4	CIV 344 Underground Utility Survey 3 4	CIV 346 Hydrographic Survey 3 4		
	CIV 3XX Elective III 3 4	→ CIV 324 Metallic Structures Design III 3 4	CIV 334 Special Topics in Foundations Engineering 3 4	CIV 352 R.C. Structures Design IV 3 4	CIV 362 Design of Irrigation Structure 3 4	CIV 364 Coastal Engineering 3 4	CIV 372 Advanced Sanitary Engineering 3 4	CIV 382 Airports Engineering 3 4	CIV 384 Railways Engineering 3 4
Level 4	CIV 4XX Elective IV 2 4	→ CIV 403 Construction project specifications, bids, and contracts 3 4	CIV 405 Value Engineering in the Construction Industry 3 4						
	CIV 4XX Elective V 3 4	→ CIV 407 Repair and Strengthening of Concrete Structures 3 4	CIV 461 Inland Navigation 3 4	CIV 471 Environmental Engineering 3 4	CIV 481 Highway Engineering II 3 4				
	CIV 4XX Elective VI 3 4	→ CIV 421 Modelling of Structures 3 4	CIV 431 Computer Application in Geotechnical Engineering and Foundations 3 4	CIV 441 Remote Sensing and Geographical Information Systems 3 4	CIV 443 Photogrammetry by Drones 3 4	CIV 451 R.C. Structures Modelling 3 4	CIV 463 Hydraulic Modelling 3 4	CIV 473 Modelling of Water & Wastewater Networks 3 4	CIV 483 Computer Application in Transportation Engineering 3 4


Civil Engineering Program Flowchart (Elective Courses)
70 Credit hours are required as a minimum for registration
Level 1-2
CIV 114
Concrete Technology
Level 1-2
CIV 162
Hydraulics
Level 2-1
CIV 221
Structure Analysis III
Level 2-1
CIV 241
Surveying for Engineers II
Level 2-2
CIV 222
Design of Metallic Structures I
Level 2-2
CIV 282
Traffic and Transportation Engineering
Level 3-1
CIV 331
Design of Foundations and Earth Retaining Structures
Level 3-1
CIV 351
Design of R.C. Structures III
Level 3-1
CIV 371
Sanitary Engineering
Level 3-1
CIV 381
Highway Engineering I
Level 3-2
CIV 300
Contracts and Legalizations
Level 3-2
CIV 304
Quality Control and Fundamentals of Repair and Strengthening of Structures
Level 2-2
CIV 2XX
Elective I
CIV 200
Civil Engineering Application I
CIV 202
Civil Engineering Application II
Level 3-2
CIV 3XX
Elective II
CIV 3XX
Elective III
Level 4-1
CIV 4XX
Elective IV
CIV 4XX
Elective V
CIV 4XX
Elective VI
CIV 471
Environmental Engineering
CIV 312
Modern Construction Materials
CIV 362
Design of Irrigation Structure
CIV 364
Coastal Engineering
CIV 461
Inland Navigation
CIV 463
Hydraulic Modelling
CIV 322
Structure Analysis IV
CIV 421
Modelling of Structures
CIV 342
Satellite Geodesy
CIV 441
Remote Sensing and Geographical Information Systems
CIV 344
Underground Utility Survey
CIV 443
Photogrammetry by Drones
CIV 346
Hydrographic Survey
CIV 324
Metallic Structures Design III
CIV 384
Railways Engineering
CIV 332
Special Topics in Geotechnical Engineering
CIV 334
Special Topics in Foundations Engineering
CIV 431
Computer Application in Geotechnical Engineering and Foundations
CIV 352
R.C. Structures Design IV
CIV 451
R. C. Structures Modelling
CIV 372
Advanced Sanitary Engineering
CIV 473
Modelling of Water & Wastewater Networks
CIV 382
Airports Engineering
CIV 481
Highway Engineering II
CIV 483
Computer Application in Transportation Engineering
CIV 403
Construction Project Specifications,Bids, and Contracts
CIV 405
Value Engineering in the Construction Industry
CIV 407
Repair and Strengthening of Concrete Structures
Prerequisite Courses
Elective Courses

Program Learning Objectives to Courses Matrix

Code	Title	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14	Total
Compulsory Humanities Courses																
UHS 101	Foreign Language								1		1					2
UHS 102	Information and Communication Technology				1						1					2
UHS 103	Societal Issues							1			1					2
UHS 104	Professional Ethics				1	1										2
Elective Humanities Courses																
UHS XXX	Humanities Elective I			1	1											2
UHS XXX	Humanities Elective II								1	1						2
UHS XXX	Humanities Elective III					1					1					2
Basic Science Courses																
BES 011	Mathematics I	1		1												2
BES 012	Mathematics II	1		1												2
BES 111	Differential Equations	1	1													2
BES 112	Numerical Analysis	1	1													2
BES 211	Engineering Statistics and Probability	1	1													2
BES 041	General Chemistry	1	1													2
BES 249	Water Chemistry	1	1		1											3
BES 141*	Pollution and Industrial Safety	1		1	1											3
BES 031	Physics I	1	1													2
BES 032	Physics II	1	1													2
Faculty Requirements Courses																
MEC 011	Engineering Graphics						1		1							2
MEC 012	Production Engineering				1		1									2
MEC 014	Computer Aided Drafting				1				1							2
ELE 042	Computer Programming Fundamentals	1		1												2
BES 021	Mechanics I	1	1													2

BES 022	Mechanics II	1	1												2
FTR 103	Field Training I							1			1				2
FTR 203	Field Training II							1			1				2
Civil Program Compulsory Courses															
		PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**	**PLO9**	**PLO10**	**PLO11**	**PLO12**	**PLO13**	**PLO14**	**Total**
CIV 101	CAD for Civil Engineering				1								1			2
CIV 111	Properties and Testing of Materials		1									1				2
CIV 113	Technology of Building Materials		1									1				2
CIV 114	Concrete Technology		1									1		1		3
CIV 121	Structure Analysis I	1										1				2
CIV 122	Structure Analysis II	1										1				2
CIV 142	Surveying for Engineers I		1			1						1				3
CIV 161	Fluid Mechanics		1									1				2
CIV 162	Hydraulics		1							1		1				3
ARC 217	Architectural Engineering					1			1							2
CIV 221	Structure Analysis III	1										1				2
CIV 222	Design of Metallic Structures I			1	1								1			3
CIV 231	Soil Mechanics		1			1						1				3
CIV 232	Geotechnical Engineering and Foundations			1								1	1			3
CIV 241	Surveying for Engineers II		1			1						1				3
CIV 251	Design of R.C. Structures I			1	1								1			3
CIV 252	Design of R.C. Structures II			1	1								1			3
CIV 261	Hydrology	1										1				2
CIV 272	Water Supply Engineering		1										1			2
CIV 282	Traffic and Transportation Engineering					1							1	1		3
CIV 300	Contracts and Legalizations								1	1				1	1	4
CIV 302	Computer Applications in Civil Engineering		1										1			2
CIV 304	Quality Control and Fundamentals of				1	1				1	1			1		5

	Repair and Strengthening of Structures														
CIV 306	Engineering Economy									1					1	2
CIV 321	Design of Metallic Structures II			1	1								1			3
CIV 331	Design of Foundations and Earth Retaining Structures			1									1			2
CIV 351	Design of R.C. Structures III			1	1								1			3
CIV 361	Irrigation and Drainage Engineering	1											1			2
CIV 371	Sanitary Engineering		1										1			2
CIV 381	Highway Engineering I			1	1								1			3
CIV 398	Senior Design Project I			1	1		1	1	1	1	1	1	1	1	1	11
CIV 401	Construction Project & Management						1			1				1	1	4
CIV 499	Senior Design Project II			1	1		1	1	1	1	1	1	1	1	1	11
Civil Program Elective Courses																
		PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**	**PLO9**	**PLO10**	**PLO11**	**PLO12**	**PLO13**	**PLO14**	**Total**
CIV 2XX	Elective I						1					1				2
CIV 3XX	Elective II					1						1				2
CIV 3XX	Elective II												1	1		2
CIV 4XX	Elective IV						1							1	1	3
CIV 4XX	Elective V					1								1		2
CIV 4XX	Elective VI		1									1				2
Total		18	21	15	17	10	7	5	8	8	9	18	17	10	6	170

Courses offered to Civil Engineering Program

The coding system is demonstrated in the following table:

BES X1X	Mathematics Courses offered by Basic Engineering Science Department
BES X4X	Chemistry Courses offered by Basic Engineering Science Department
ARC XXX	Course offered by Architecture Engineering Department
CIV XXX	Course offered by Civil Engineering Department
CIV X0X	Cad, Management, Quality Control, Repair, and Civil Application Courses
CIV X1X	Material courses
CIV X2X	Structural and Metallic courses
CIV X3X	Soil and Foundation Courses
CIV X4X	Surveying Courses
CIV X5X	Reinforced Concrete Courses
CIV X6X	Water Courses
CIV X7X	Environmental Courses
CIV X8X	Transportation Courses
CIV X9X	Graduation Project

The following abbreviations are the legend for the courses:

The following abbreviations are the legend for the courses:	
Lec	Lectures
Lab	Laboratory
Tut	Tutorials
SA	Student Activity
MT	Mid-Term Exam
PE	Practical Exam
OE	Oral Exam

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 101	CAD for Civil Engineering	MEC 014	2	1	3	0	4	30	30	0	40
Course Contents	Application of AutoCAD Program in drawing different types of civil structures (Irrigation structures – Reinforced concrete structures – Steel structures- urban transportation systems).										
References	A Textbook of Engineering Drawing: Along with an Introduction to AutoCAD, International Publishing House, 2015. ISBN 9789384588687										
Laboratory	• Irrigation structures drawing. • Reinforced concrete structures drawing. • Steel structures drawing. • Transportation systems drawing.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 111	Properties and Testing of Materials	BES 022	3	2	2	0	4	10	30	20	40
Course Contents	Stress and strain - Types of tests - Testing machines - Strain gauge devices - Static tension test - Static compression test - Bending test - Shear test - Torsion test - Hardness test - Fatigue test - Impact test - Metals creep teSA										
References	• Mechanics of Materials, James M. Kere & Barry J. Goodno, CENGAGE Learning, ISBN-13: 978-1111577735 / ISBN-10: 1111577730. • Strength of Materials, S. S. Bhavikatti,Vikas, Vicas, ISBN-13: 978-9325971578, ISBN-10: 9325971577. • A Textbook of Strength of Materials, Dr R.K. Bansal, LAXMI PUBLICATIONS (P) LTD, ISBN-10: 9788131808146 / ISBN-13: 978-8131808146. • المواد الهندسية مقاومتها واختبارها (الجزء الأول والجزء الثاني)، ا.د. احمد العريان - ا.د. عبد الكريم عطا • مقاومة واختبار المواد، د. عبد الوهاب محمد عوض - د. إبراهيم على درويش. • المواصفات القياسية المصرية.										
Laboratory	• Static tension teSA • Static compression teSA • Bending teSA • Hardness teSA • Impact teSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 113	Technology of Building Materials	BES 041	2	2	1	0	3	10	30	20	40
Course Contents	Specifications and standard specifications of materials and products - Main properties of engineering materials - Building Rocks - Mineral binding materials (Lime, Gypsum & Cement) - Concrete aggregates - Steel reinforcement - Timber - Bricks – Introduction to fibre reinforced polymers.										
References	• للكود المصري لتصميم وتنفيذ المنشآت الخرسانية – 203. • الملحق الثالث للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (دليل الاختبارات المعملية لمواد الخرسانة). • Building Materials, S. K. Duggal, Routledge, ISBN-10: 8122433790 / ISBN-13: 978-8122433791. • Materials of construction, R.C. Smith, McGraw-Hill, ISBN-10: 0070584761, ISBN-13: 978-0070584761.										
Laboratory	• Specific surface area of cement – Setting time of cement - compressive strength of cement • Sieve analysis of coarse and fine aggregate – bulk density of aggregate – specific • Coarse aggregate crushing value – Los Angles abrasion value of coarse aggregate. • Compression test of bricks.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 114	Concrete Technology	CIV 113	3	2	2	0	4	10	30	20	40
Course Contents	Introduction to concrete as a structural material - Mixing water - Concrete manufacture (Batching - Mixing - Transportation - Placing - Compacting - Surface finishing, Repair and curing) - Properties of fresh concrete (Consistency - Workability - Segregation and bleeding) - Properties of hardened concrete (Strength - Shrinkage - Elasticity - creep) - Durability of concrete - Mix design - Non-destructive testing (Rebound hammer - Ultrasonic Pulse velocity and core) - Concrete admixtures - Special concretes.										
References	• Concrete Technology, AM Neville, JJ Brooks, Longman, ISBN-10: 0273732196, ISBN-13: 978-0273732198. • Properties of Concrete and Structures, P.K. Mehta, Prentice Hall, ISBN-10: 0131671154, ISBN-13: 978-0131671157. • تكنولوجيا الخرسانة" (الجزء الأول والجزء الثاني)، أ.د. أحمد العريان - أ.د. عبد الكريم عطا. • الكود المصري لتصميم وتنفيذ المنشآت الخرسانية- 203. • الملحق الثالث للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (دليل الاختبارات المعملية لمواد الخرسانة).										
Laboratory	• Compacting factor test - Slump teSA • Compressive strength test - Splitting tensile strength test – Modulus of rupture teSA • Rebound hammer test - Ultrasonic Pulse velocity teSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 121	Structure Analysis I	BES 021	3	2	0	2	4	30	30	0	40
Course Contents	Loads and reactions – Stability of structures (external and internal) – Straining actions in Statically determinate structures- Normal stresses – Shear stresses (pure shear, torsional) – Combined stresses.										
References	• Structural Analysis by Russell C. Hibbeler, Pearson, 9th Edition, 2014, ISBN-13:978-0-13-394284-2. • Kenneth M. Leet, Chia-Ming Uang, Joel T. Lanning, Anne M. Gilbert. “Fundamentals of Structural Analysis”. McGraw-Hill Education, 2018. ISBN-13: 978-0073398006 • George, N. Frantziskonis. “Essentials of the Mechanics of Materials, Second Edition”. USA: Destech Publications, Inc. 2013. ISBN 13: 9781605950983 • Pytel, A. and Kiusalaas, J. “Mechanics of Materials Second Edition”. Cengage Learning2012. ISBN-13: 978-0-495-66775-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 122	Structure Analysis II	CIV 121	3	2	0	2	4	30	30	0	40
Course Contents	Buckling of Column, Elastic deflection of determinate structures (double Integration method and virtual work method). Influence line for determinate beam- Analysis of statically indeterminate structures (Three moment equations).										
References	• Aslam Kassimali , "Structural Analysis" Stamford USA: Cengage Learning, 4th Si Edition, 2011, ISBN-13: 978-0-495-29567-9 • Aslam Kassimali, "Structural Analysis", Stamford USA: Cengage Learning, 6th Si Edition, 2019, ISBN-13 : 978-1337630948 • Jack C. McCormac, "Structural Analysis Using Classical and Matrix Methods", John Wiley & Sons, Inc, 4th Edition, 2007, ISBN-13: 978-0470036082.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 123	Structure Analysis	BES 021	3	2	-	2	4	30	30	-	40
Course Contents	The course is an introduction to the basic tools of structural analysis and design. It contributes to the knowledge and skills required by the civil engineers in the following topics: Loads and reactions, stability of structures (external and internal), straining actions in statically determinate structures, normal stresses, shear stresses (pure shear, torsional), combined stresses, elastic deformations, and introduction to the analysis of statically indeterminate structures through 3-moment equation.										
References	• Structural Analysis by Russell C. Hibbeler, Pearson, 9th Edition, 2014, ISBN-13:978-0-13-394284-2. • Kenneth M. Leet, Chia-Ming Uang, Joel T. Lanning, Anne M. Gilbert. "Fundamentals of Structural Analysis". McGraw-Hill Education, 2018. ISBN-13: 978-0073398006										
Used in Program	Architecture Engineering Program							Semester	3		

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 142	Survey for Engineers I	BES 012	3	2	2	0	4	10	30	20	40
Course Contents	Basics of surveying and mapping (Definitions - Units - Scales- Reconnaissance - Sketch drawing)- Distance measurement (principles - optical measurements- EDM) - Angle and direction measurement (Vertical & Horizontal angle measurements) -Traverse (Traverse computation & adjustment) - Intersection and Resection - Area & volume computation - Vertical control & Leveling (Definitions - Methods of determining relative heights - Topographic maps - Precise leveling - Trigonometric leveling).										
References	• Elementary surveying. An introduction to geomatics by Ghilani C.D., Wolf P.R., PH 2011, ISBN 0132554348 • Engineering Surveying. W. Schofield& M. Breach, CRC Press, 2007, ISBN 9780750669498. • Surveying Problem Solving with Theory and Objective Type Questions *Dr* / A M Chandra - ISBN (13): 978-81-224-2532-1										
Laboratory	• Linear surveying measurements • Theodolite parts and calibration • Vertical and Horizontal angle measurements • Tacheometric surveying • Survey levelling instruments and height determination										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 143	Construction Survey	BES 012	3	2	2	0	4	10	30	20	40
Course Contents	To introduce the student to basic elements of surveying and their architectural applications. Plotting scales. Vertical and horizontal angle measurement, levelling & theodolites. Map drawing. Traverse computations and adjustment. Area and Volume calculations. Photogrammetry and its architectural applications. Remote sensing.										
References	• Engineering Surveying. W. Schofield& M. Breach - Sixth Edition 2007- ISBN–13: 978-0-7506-6949-8 • Surveying Problem Solving with Theory and Objective Type Questions Dr / A M Chandra-2005- ISBN (13) : 978-81-224-2532-1										
Laboratory	• Linear surveying measurements • Theodolite parts and calibration • Vertical and Horizontal angle measurements • Survey levelling instruments and height determination										
Used in Program		Architecture Engineering Program						Semester			3

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 152	Design of RC Structures	CIV 123	2	2	0	1	3	30	30	0	40
Course Contents	The course presents the fundamentals of reinforced concrete structures such as reinforcement details of beams, solid slabs, columns, and stairs. It focuses on loads and load distribution. The course contributes to the knowledge and skills in the following topics: Statically determinate frames, ribbed and hollow block slabs, paneled beam slabs, flats slabs, and openings in slabs.										
References	• Egyptian Code of Practice – ECP 201-2018 • Structural design for architecture – Angus j macdonald, ISBN 0 7506 3090 6										
Used in Program	Architecture Engineering Program							Semester	4		

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 161	Fluid Mechanics	BES 031	2	2	1	0	3	10	30	20	40
Course Contents	Dimensions and Units - Fluid Properties - Fluid Statics (Pressure distribution - Pressure measurements - Forces on submerged surfaces) - Buoyancy and Floatation - Fluids in Relative Equilibrium - Fluid Kinematics (Description of Fluids motion - Continuity Equation - Velocity and Acceleration) - Fluid Dynamics (Energy Equation - Applications of Bernoulli's Equation) - Impulse-Momentum Equation - Application of the Momentum Equation - Flow in Pipes – Pipes Systems.										
References	• A Brief Introduction to Fluid Mechanics, sixth Edition by Donald F. Young, Bruce R. Munson, Theodore H. Okiishi, Wade W. Huebsch, Wiley 2010, ISBN: 0470596791, 9780470596791 • E. Shashi Menon, "Liquid Pipeline Hydraulics", Marcel Dekker, 2004.										
Laboratory	• Determine Densities, Specific Gravities, Weights and Viscosity. • Bernoulli's Theorem Demonstration. • Flow through sharp edged Orifice. • Flow over Rectangular and Triangular Weirs. • Friction in a smooth bore pipe, Minor loss Experiment.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 162	Hydraulics	CIV 161	2	2	1	0	3	10	30	20	40
Course Contents	Basic Principles (open channel flow) - Uniform Flow (Basic equations for steady uniform flow - Velocity and shear stress distributions in open channels) – Non-Uniform Flow (Specific energy - Hydraulics of channel bed transition) - Hydraulic Jumps - Gradually Varied Flow - Open Channel Design (Rigid boundary and erodible channel) - Dimensional analysis and Similarity (Methods of dimensional analysis - Model analysis and similarity) – Hydraulics Machinery (Pumps and Turbines) – Unsteady Flow.										
References	• Fundamentals of Hydraulic Engineering, by Prasuhn, Alan L., Oxford University Press 1992, ISBN 978-1-61344-141-1, 978-0-19-510732-6 • Strum, W. T., (2001). Open Channels Hydraulics, McGraw-Hill Higher Education, USA. • Chow, V.T (ed.): "Handbook of Hydrology," McGraw-Hill, New York, 1964. • Novak, P., Moffat, A. I. B., Nalluri, C., Narayanan, R. (2001) Hydraulic Structures, Third Ed, Spon, London										
Laboratory	• Open Channel Flow • Hydraulic Jump • Pump Characteristics										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 200	Civil Engineering Application I	Completion of 70 CR	3	2	2	0	4	30	30	0	40
Course Contents	The main elements of structures - Construction techniques - Types of Formworks (wooden forms -metallic forms - tunnel formwork - climbing formwork - slip formwork - lift slabs system) - Formwork design, implementation and receiving - Steel reinforcement works and receiving - bricks works.										
References	• Construction Technology Paperback English by Mr Roy Chudley, Roger Greeno ISBN-13 9780131286429 • Fundamentals of Building Construction : Materials and Methods, By Edward Allen, Joseph Iano, ISBN13 9781119446194										
Laboratory	• Construction techniques • Wooden formwork • Metallic formwork • Bricks works										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 202	Civil Engineering Application II	Completion of 70 CR	3	2	2	0	4	30	30	0	40
Course Contents	Thermal insulation - Water proofing - Water supply and sanitary works - Flooring - Doors and windows - Internal and External Finishes (Plastering and Painting). Construction of Steel Structures (Cutting - Drilling- Shaping - Welding - Bolts - Erection – Cladding).										
References	• Construction Technology Paperback English by Mr Roy Chudley, Roger Greeno, ISBN-13 9780131286429 • Structural steel fabrication and erection by s.k.saxena, r.b.asthana, isbn-13 : 978-8170392071										
Laboratory	• Thermal insulation works, Water proofing works, Water supply and sanitary works, Flooring works, Wood works, Painting works, Steel welding works										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 221	Structure Analysis III	CIV 122	3	2	0	2	4	30	30	0	40
Course Contents	Analysis of statically indeterminate structures:1-Force approach (Consistent deformation method), 2- Displacement approach (Slope deflection Method, Moment distribution method). Introduction to Matrix Structural Analysis for 1-D element using Stiffness method (Truss, Beam, and frame elements).										
References	Aslam Kassimali, “Structural Analysis”, Cengage Learning, Fifth Edition, 2015. ISBN-13: 978-1133943891										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 222	Design of Metallic Structures I	CIV 122	3	2	0	2	4	30	30	0	40
Course Contents	Steel as a construction material - Material properties and steel sections - Allowable Stress Design method - Design of tension members - Design of compression members - Columns in braced and unbraced frames - Design of flexural members - Types and classification of beam cross sections - Design of laterally supported and unsupported beams - Design of beam-columns (axial and flexural forces) - Design of bolted connections - Design of welded connections.										
References	• Egyptian code for design of steel structure. • Steel structures design by Prof Dr. Abdulrahim Khalil Dessouki. • Advanced Steel Design Of Structures, by Prof. Srinivasan Chandrasekaran, Indian Institute of Technology, India. ISBN-13 9780367232900 • Steel Designers' Manual, By (Steel Construction Institute), Edited by Buick Davison and Graham W. Owens, ISBN-13 9781119249863										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 231	Soil Mechanics	CIV 111	3	2	2	0	4	10	30	20	40
Course Contents	Introduction to Geotechnical Engineering - Definitions and Relationships - Index Properties of Soil - Soil Classification Systems (Unified – British) - Permeability and Seepage of Soil (Darcy's Law - Capillarity in Soils - Flow Net Analysis) - Stress Distribution in Soil (Point load – Uniform Load (Newmark – Fadum - Approximation)) - Shear Strength of Soil (Direct Shear Box - Triaxial– Unconfined Compression) - Lateral Earth Pressure (Active and Passive) - Soil Compaction (Standard Proctor - Modified Proctor).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • Das, B. M, Soil Mechanics Laboratory Manual, Oxford University Press, 9th. Ed., ISBN 978 – 019 – 020 – 966 – 7, 2016.										
Laboratory	• Specific Gravity Determination. • Atterberg Limits (Liquid Limit – Plastic Limit – Shrinkage Limit). • Grain Size Distribution - Coarse Grained Soils. (Sieve Analysis). • Grain Size Distribution - Fine Grained Soils (Hydrometer Analysis). • Determination of Natural Unit Weight of Soil (Sand Bottle Test - Core Cutter Test). • Constant Head Permeability TeSA • Falling Head Permeability TeSA • Direct Shear Box TeSA • Tri-axial Shear TeSA • Unconfined Shear TeSA • Standard Proctor TeSA • Modified Proctor TeSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 232	Geotechnical Engineering and Foundations	CIV231 CIV251	3	2	2	0	4	10	30	20	40
Course Contents	Soil Consolidation and Settlement (Soil Consolidation Theory - Primary and Secondary Settlement - Oedometer Test) - Bearing Capacity of Soil (Terzaghi Eq. - Mayerhof Eq. – Egyptian Code Eq.) - Shallow Foundations (Construction Considerations - Design Considerations) - Design of Isolated Footings (Square and Rectangular Footings – Footing with Moment) - Design of Strip Footings - Design of Combined Footings - Design of Strap Beam Footings - Design of Rafts (Conventional Method – Ribbed Raft).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Engineering of Surface Foundations, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (19440/2015), ISBN 978 – 977 – 726 – 139 – 5, 2015. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Das, B. M, Soil Mechanics Laboratory Manual, Oxford University Press, 9th. Ed., ISBN 978 – 019 – 020 – 966 – 7, 2016.										
Laboratory	• One Dimensional Consolidation Test (Oedometer Test). • SPT: Standard Penetration TeSA • CPT: Cone Penetration TeSA • Plate Loading TeSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 241	Survey for Engineers II	CIV 142	3	2	2	0	4	10	30	20	40
Course Contents	Basics of geodesy- Geodetic datum – Reference Ellipsoid- Geoid determination –Terrestrial Coordinate systems and associated transformations – Geodetic position computations on the reference Ellipsoid (2 D approach for horizontal control)- Geodetic position computations in Space (3 D approach) – direct Geodetic problem – Inverse Geodetic problem – (GNSS) Global Navigation Satellite System - Satellite orbits - Satellite signals – Observables - Mathematical models for positioning - Data processing - Data transformation.										
References	• Elementary surveying. An introduction to geomatics by Ghilani C.D., Wolf P.R., PH 2011, ISBN 0132554348 • Engineering Surveying. W. Schofield& M. Breach, CRC Press, 2007, ISBN 9780750669498. • Surveying Problem Solving with Theory and Objective Type Questions Dr / A M Chandra - ISBN (13): 978-81-224-2532-1										
Laboratory	• Total station parts • Total Station software • Coordinates by Total Station • Lay out and setting out by Total Station										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 251	Design of R.C. Structures I	CIV 114 CIV 122	3	2	0	2	4	30	30	0	40
Course Contents	Properties of concrete materials - Ultimate limit states design method - Design of sections under pure bending moment (Rectangular, L & T - sections) - Load distribution – Design of section under shear – Design simple and continuous beams - Design of one-way and two-ways solid slabs - Design of hollow block slabs - Design of panelled beams.										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018 • Design of Concrete Structures, Arthur H Nilson, D.Darwin, Charles W. Fifteenth Edition,2016. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume I, second edition, 2012. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 2, Third edition, 2012. • Fundamentals of Reinforcement Concrete and Prestressed concrete, M.Hilal, 1987.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 252	Design of R.C. Structures II	CIV 251	3	2	0	2	4	30	30	0	40
Course Contents	Design of flat slabs - Design of sections subjected to bending moment and axial force - Analysis and design of columns – Design of RC frames -Design of Sections under Torsion- Serviceability limit states (deflection - crack width).										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018 • Design of Concrete Structures, Arthur H Nilson, D.Darwin, Charles W. Fifteenth Edition,2016. • Fundamentals of Reinforcement Concrete and Prestressed concrete, M.Hilal, 1987. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 2, Third edition, 2012. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 3, First edition, 2011.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 261	Hydrology	CIV 162	2	2	0	1	3	30	30	0	40
Course Contents	Introduction to water balance and hydrological cycle – Precipitation – Evaporation –Transpiration – Infiltration – Runoff – Hydrograph – Hydrology of the Nile basin – Flood routing – Storage and reservoir operation – Groundwater hydrology (Aquifers and groundwater reservoirs – confined and unconfined flow – design of wells – Groundwater management) – Application of computer programs in hydrology such as HEC-RAS.										
References	• Mays, L.W., Ground and surface water hydrology. John Wiley & Sons, Inc., 2012. ISBN: 978-0-470-16987-2 • Subramanya, K., Engineering Hydrology. 4th Edition 2017.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 272	Water Supply Engineering	CIV 162	3	2	2	0	4	10	30	20	40
Course Contents	Introduction, Preliminary studies for water supply projects, sources of water, water quality and standards, design flow rates, water collection, Design of water treatment plants using conventional processes (Sedimentation - Coagulation and Flocculation - Filtration - Disinfection), water pumping and transportation works, water storage, water distribution networks.										
References	• Water and Wastewater Technology: Pearson New International Edition, ISBN-13: 9781292021041 • Water supply, prof. Dr. M. Basiouny • Lectures presentations • شبكات المياه - الكود المصرى • محطات تنقية مياه الشرب - الكود المصرى										
Laboratory	Determine Turbidity, PH, Temperature, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Volatile Solids (VS), Chloride, Iron and Manganese, Arsenic, Fluorides and total bacteria account										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 282	Traffic and Transportation Engineering	BES 112 BES 211	3	2	2	0	4	10	30	20	40
Course Contents	Transportation Planning: Introduction to transportation planning - Study area - Transportation planning surveys - Travel demand forecasting (Trip generation - Trip distribution - Modal split (Mode Choice) - Traffic assignment) - Transportation evaluation Traffic Engineering: Introduction (Road user characteristics - Vehicle characteristics) - Traffic volume - Traffic speed - Traffic density - Travel time and delay studies - Traffic Flow characteristics - Parking studies - Traffic control devices - Intersection control - Traffic signals design.										
References	• Traffic and Highway Engineering, Nicholas Garber and Lester Hoel, Fifth Enhanced SI Edition, CENGAG Learning, 2020, ISBN-13: 978-1-337-63104-4. • الكود المصرى للطرق – 2020 .										
Laboratory	• Traffic surveys (traffic volume count) • Speed & delay study • Parking study • Roadside and household interviews.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 300	Contracts and Legalizations	CIV 222 CIV 252	2	2	0	1	3	30	30	0	40
Course Contents	Define contract documents, define priority of contract documents, regulations, construction law Plan and manage construction documents, deal with biddings and financial issues including project insurances, disputes. Acquire knowledge and understanding the ability to prepare and analyze the bill of quantities for any specified project. The preparation and calculation of the on-going works quantities. The ability to manage construction project.										
References	• law no 89 issue year 1998, civil law • law no 82/2018, civil law • Fidic contracts forms 2017 red book edition, ISBN: 978-2-88432-084-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 302	Computer Applications in Civil Engineering	CIV 122 ELE 042	2	1	3	0	4	30	30	0	40
Course Contents	Introduction to analyzing structures using the computer - Choosing appropriate models for analyzing different structures - Applications to internal forces and deformations in space structures (Beams, Frames, and Trusses) - Applications to represent supports in the frames including the interaction between the structures and the soil - Structural deformations - Thermal effect on structures - Computer Applications for Design of Reinforced Concrete Structures (Design of columns and beams) - Data Base Forming - Curves and Charts Drawing - Optimization.										
References	Computer Application in Civil Engineering, dsmbooks, Liverpool, United Kingdom, ISBN 13: 9789382174202.										
Laboratory	• Modelling of space structures (Beams, Frames, and Trusses). • Modelling of supports in the structures including the interaction between the structures and the soil. • Thermal effect on structures. • Applications for Design of Reinforced Concrete Structures (Design of columns and beams). • Data Base Forming, Optimization										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 304	Quality Control and fundamentals of Repair and Strengthening of Structures	CIV 252 CIV 321	2	2	0	1	3	30	30	0	40
Course Contents	Definition of quality control and assurance - Quality control requirements – Quality control of concrete materials – Quality control before concreting - Quality control during concreting - Quality control after concreting – Assessment of hardened concrete results – Quality control levels – Statistical quality control – Assessment of reinforced concrete structures - Defects of Reinforced concrete structures – Fundamentals of strengthening and repair of reinforced concrete structures – Assessment of steel structures - Defects of steel structures – Fundamentals of strengthening and repair of steel structures.										
References	• 203 - الكود المصري لتصميم وتنفيذ المنشآت الخرسانية. • El-Kasaby, E. A., Repair of concrete structures, Dar Al-Kutub Al-Almia, Cairo, 2nd Ed., (19441/2015), ISBN 978-977-726-140-1, 2016. • Quality Management in Construction Projects by Abdul Razzak Rumane, ISBN-13: 978-0367890032, ISBN-10: 0367890038. • Concrete Structures: Protection, Repair and Rehabilitation by R. Dodge Woodson, ISBN-13: 978-1856175494, ISBN-10: 1856175499. • Egyptian codes for design of steel structure. • Steel Designers' Manual, By (Steel Construction Institute), Edited by Buick Davison and Graham W. Owens, ISBN-13 9781119249863 • Strengthening of Steel Structures: Performance of Steel Beams Bonded with FRP by LAP LAMBERT Academic Publishing, ISBN-10 : 9783844384192 ISBN-13 : 978-3844384192										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 306	Engineering Economy	-	2	2	0	1	3	30	30	0	40
Course Contents	Foundations of Engineering Economy, Interest Factors, Nominal and Effective Interest Rates, Present Worth Analysis, Annual Worth Analysis, Rate of Return Analysis, Benefit/Cost Analysis, Breakeven and Payback Analysis, Replacement and Retention Decisions, Effects of Inflation, Estimating Costs, Depreciation Methods, After-Tax Economic Analysis, Multiple Attributes and Risk.										
References	• Basics of Engineering Economy, Leland Blank & Anthony Tarquim, McGraw HILL, Third Edition, 2020, ISBN-13 : 978-1260571141 • Engineering Economy, William G. Sullivan, Elin M. Wicks, & C. Patrick Koelling, Seventeenth Global Edition, Pearson, 2020, ISBN 13: 978-1-292-26490-5. • Engineering Economy, Leland Blank & Anthony Tarquim, McGraw HILL, Eighth Edition, 2018, ISBN: 978-0-07-352343-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 312	Modern Construction Materials	CIV 114	3	2	0	2	4	30	30	0	40
Course Contents	Different types of new construction materials (for examples, fiber reinforced polymer & Geopolymer concrete) – Constituents of new construction materials - Properties of the new construction materials (Physical, Chemical & Mechanical properties) - Fabrication technology - Comparison with conventional construction materials - Structural applications - Testing - Economical point of view.										
References	• الكود المصري لأسس تصميم وإشتراطات تنفيذ استخدام البوليمرات المسلحة بالألياف في مجالات التشييد – 205. • Construction Materials, their Nature and Behavior, Marios Soutsos, Edited by Peter Domone and John Illston, ISBN-13: 978-1498741101 / ISBN-10: 9781498741101. • Fundamentals of Materials Science and Engineering, William D. Callister Jr., David G. Rethwisch, Wiley Abridged Print Companion, ISBN-13: 978-1119498926, ISBN-10: 1119498929.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 321	Design of Metallic Structures II	CIV 222	3	2	0	2	4	30	30	0	40
Course Contents	Classical bridge types - Different bridge systems - loads (Roadway - Railway - Other loads) - Design of floor beams systems - plate girder bridges (Preliminary proportioning - Design for bending - Design for shear - Combined shear and moment - Buckling of plates - Longitudinal and transversal stiffeners - Load bearing stiffeners - Splices - Curtailment of flange plates - Details) - Wind bracing systems - bridge bearings.										
References	• Egyptian code for design of steel structure. • Steel bridges by Prof. Metwally Abu-Hamd, Cairo University • Planning and Design of Bridges, by Prof. M.S. Troitsky, ISBN-13 9780471028536										

.	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 322	Structure Analysis IV	CIV 221	3	2	0	2	4	30	30	0	40
Course Contents	Dynamic equilibrium; Dynamic equations of motion for single-degree-of-freedom systems; Analysis of free and forced vibration. Damping in structures. Numerical evaluation of dynamic response. Dynamic equations of motion for two and multi degrees of freedom structures; Natural vibration properties of structures and Mode Shapes. Modal superposition method; Introduction to response history analysis; Response spectrum for elastic structures. Seismological Background (Earthquakes, causes, effects, and scales) - Egyptian Code applications (Earthquake analysis using equivalent static method- Response spectrum analysis).										
References	• Aggarwal P., Shrikhande, M., "Earthquake Resistant Design of Structures", Prentice Hall India Learning, Private Limited; 1 edition, 2006, ISBN-13: 978-8120328921. • Anil K. Chopra, " DYNAMICS OF STRUCTURES", Prentice Hall, United States of America; 4th edition, 2012, ISBN-13: 978-0132858038. • Ray W. Clough, Joseph Penzien " DYNAMICS OF STRUCTURES", Computers & Structures, Inc, United States of America; 3rd edition, 2003.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 323	Design of Steel Structures	CIV 123	2	2	0	1	3	30	30	0	40
Course Contents	The course presents the fundamentals of steel structures and materials through the following topics: such as material properties and steel sections, allowable Stress Design method - Concept of tension members, compression members, and flexural members, the different Types and classification of beam cross sections, Concept of beam-columns (axial and flexural forces), bolted and welded connections.										
References	• Egyptian code for design of steel structure. • Advanced Steel Design Of Structures, by Prof. Srinivasan Chandrasekaran, Indian Institute of Technology, India. ISBN-13 9780367232900 • Steel Designers' Manual, By (Steel Construction Institute), Edited by Buick Davison and Graham W. Owens, ISBN-13 9781119249863										
Used in Program		Architecture Engineering Program					Semester	7			

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 324	Metallic Structures Design III	CIV 222	3	2	0	2	4	30	30	0	40
Course Contents	Composite construction - composite floor beams (Strength requirement - shear connectors - formed metal deck) - Design of composite columns - Flexural design of slender sections - Connection classification and design (Flexible - Rigid – Semi rigid) - Design of base plates and anchor bolts – Introduction of Load and Resistance Factor Design (LRFD) - Identification of Limit states (Strength limit state and Serviceability limit state) - Design of tension, compression and flexure members using LRFD approach.										
References	• Egyptian Code of Practice for Steel Construction and Bridges (LRFD). • Steel structures design by Prof Dr. Abdulrahim Khalil Dessouki. • Steel Design for Engineers and Architects, by David A. Fanella, Rene Amon, Bruce Knobloch, Atanu Mazumder, United States of America ISBN-13: 978-1-4615-9731-5										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 331	Design of Foundations and Earth Retaining Structures	CIV 232	3	2	0	1	3	30	30	0	40
Course Contents	Pile Foundations (Types of Piles - Load Transfer Mechanisms - Static Capacity for Piles - Field Load Tests – Pile Group – Elastic Centre Method - Design of Pile Caps) - Introduction to Earth Retaining Structures - Pile wall (Secant piles - Tangent Piles - Bored Pile Wall) - Construction Techniques and Design of Retaining Walls (Cantilever RW – Counterfort RW) – Introduction to Reinforced Soil RW - SPW.										
References	• El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 332	Special Topics in Geotechnical Engineering	CIV 331	3	2	0	2	4	30	30	0	40
Course Contents	Soil Exploration and Site Investigation (Field Exploration - Geological Surveys - Borings and Soil Boring Reports) - Stability of Slopes (Slope Failures Causes - Wedge - Friction Circle - Slices Method) - Difficult Soils (Collapsible - Soft Soil – Swelling - Fill) - Soil Stabilization and Improvement Techniques – Soil Grouting - Ground Water and its Control (Design Consideration – Surface Dewatering – Well Point System - Shallow and Deep Wells – Freezing Process - Soil Filter – Construction Precautions)										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 334	Special Topics in Foundations Engineering	CIV 331	3	2	0	2	4	30	30	0	40
Course Contents	Piers and Caissons (Construction and Design Considerations) – Wall Supports (Shafts - Mechanical Stabilization Wall - Crib - Barrette - Gabions) - SPW (Cantilever – Anchored (Free - Fixed – Grouted)) - Braced Excavations (Design Consideration – Berline Wall) - Reinforced Soil RW by Geotextiles - Soil Nailing and Anchoring - Cofferdams - Ground Oil Steel Tanks - Foundations on Difficult Soil - Foundations for Offshore Structures – Introduction in Tunnel Engineering - Dams (Earth Dams – Seepage - Dams Failures).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bernhard Maidl; Markus Thewes; Ulrich Maidl, Handbook of Tunnel Engineering, Volumes I and II, ISBN 978 – 343 – 303 – 078 – 3, 2014. • Robin Fell; Patrick MacGregor; David Stapledon; Graeme Bell; Mark Foster, Geotechnical Engineering of Dams, CRC Press, 2nd Ed., ISBN 978 - 113 – 800 – 008 – 7, 2018. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 342	Satellite Geodesy	CIV 241	3	2	0	2	4	30	30	0	40
Course Contents	Geodetic positioning using Artificial Satellites – positioning by satellites – satellite orbital space geometry – satellite coordinates and associated transformations – satellite Cartesian coordinates in the average terrestrial system – Satellite observing techniques - Basic Observation Concepts and Satellites Used in Geodesy - Doppler Techniques - Satellite Altimetry – Applications of Satellite altimetry.- Digital Elevation Models and Digital Terrain Models - Data Sources for Digital Terrain Modeling.										
References	• Seeber · Satellite Geodesy -2nd completely revised and extended edition - Walter de Gruyter ·Berlin New York 2003 - ISBN 3-11-017549-5 • Bock, Y., Leppard, N. (eds.) (1990): Global Positioning System. An Overview. Symposium No. 102, Edinburgh, August 7-8, 1989. International Association of Geodesy. Symposia, Springer-Verlag, New York - ISBN 978-1-4615-7111-7 • Zhilin Li, Qing Zhu, Christopher Gold (2004) DIGITAL TERRAIN MODELING Principles and Methodology -ISBN 0-415-32462-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 344	Underground Utility Survey	CIV 241	3	2	0	2	4	30	30	0	40
Course Contents	Basics of Surveying the Underground - Transferring Traversing and Levelling Measurements Transferring surface coordinates to underground workings Understanding limitations of transfer techniques - Traditional Methods to Map Utilities -Common Utility Types - Basic introduction to utility detection theory and methods –Electromagnetic pipe and cable locators Basic Ground Penetrating Radar (GPR) - Principles- Electro Magnetic VS GPR Comparison.										
References	• Walker J, Awange JL (2018) Surveying for Civil and Mine Engineers. Springer Nature. • Awange J, Paláncz B Geospatial Algebraic Computations. 3rd edition. Springer-Verlag GmbH- ISBN 978-3-030-45803-4 • Costello, Brad, UNDERGROUND CHECK SURVEY, ENG4111/4112 – Undergraduate dissertation, University of Southern Queensland, 2016. (https://eprints.usq.edu.au/31389/1/Costello_B_Gharineiat.pdf) • Erica Carrick utsi (2017) Ground Penetrating Radar Theory and practice – Elsevier - Paperback ISBN: 9780081022160										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 346	Hydrographic Survey	CIV 241	3	2	0	2	4	30	30	0	40
Course Contents	Hydrographic standards and classifications - Vertical depth measurements - Horizontal position fixing - Effects of vessel roll pitch and heave - The WGS84 datum - GNSS Terminology - Differential GNSS Reference Stations (DGPS & ERS) - Specifying hydrographic surveys - ERS Datum Transformation Requirements - Tides and Water Levels Requirements - Depth Sounding - Multibeam and Other Echosounders -Corrections to Echo Soundings and Uncertainty Assessment - Acoustic Backscatter.										
References	• HYDROGRAPHIC SURVEYS SPECIFICATIONS AND DELIVERABLES, April 2017 - National Oceanic and Atmospheric Administration • US Army Corps of Engineers. 1994. Hydrographic Surveying: Engineering and Design, Washington DC, US Army Corps of Engineers- ISBN 1110-2-1003										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 351	Design of R.C. Structures III	CIV 252	3	2	0	1	3	30	30	0	40
Course Contents	Halls - Arched systems (slab - girder) - Prestressed concrete (beams) - Design of water structures (Circular tank - Rectangular tanks - Underground tanks - Elevated tanks - Wide tanks) - Design of shell structures (domes - cones)- Design of deep beams.										
References	Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018. Arthur H Nilson, D.Darwin, Charles W. Design of Concrete Structures, Fifteenth Edition,2016. Mohammed Hilal, 1987, Design of Reinforced Concrete Halls – Part 1 & 2. Mashhour Ghoneim, Mahmoud Elmihilmy, Design of reinforced concrete structures, Volume 3, First edition, 2011. Mohammed Hilal, 1987, Theory And Design of Reinforced Concrete Tanks part 1 & 2.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 352	R.C. Structures Design IV	CIV 351	3	2	0	2	4	30	30	0	40
Course Contents	Pre-stressed concrete (slabs) – Types of joints (construction – shrinkage – expansion)- Design of short cantilever- Design of high-rise buildings (Loads – Resisting systems – Design of structural elements – Reinforcement details) – Types of R.C. bridges – Design of R.C. bridges (Slab type – Girder type – Box-girder type).										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018. • Design of Prestressed Concrete, Arthur H Nilson, 2nd Edition, 1991. • Fundamentals of Reinforcement Concrete and Prestressed concrete, M.Hilal, 1987. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 3, First edition, 2011.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 361	Irrigation and Drainage Engineering	CIV 161	2	2	0	1	3	30	30	0	40
Course Contents	Introduction, the Nile River, water consumptions, Irrigation methods, planning of irrigation networks, Basis and procedures for designing canal sections. Sprinkler irrigation, drip irrigation, Sources of drainage water, importance of land drainage, clarification of drainage systems. Surface and subsurface drainage, Design of horizontal and vertical drainage systems, drainage system performance, reuse of drainage water. Planning of irrigation projects.										
References	• Waller P, Yitayew M, Irrigation and Drainage Engineering, Springer 2016. ISBN: 978-3-319-34631-1 • Shun Lin, C. Lee. Water and Wastewater Calculations Manual, McGraw-Hill Professional, Second Edition, 2007, ISBN-13: 978-0071476249										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 362	Design of Irrigation Structures	CIV 162	3	2	0	2	4	30	30	0	40
Course Contents	Introduction, irrigation and drainage network, irrigation structures and their functions, general requirements and design considerations (hydraulic design, loads, stability, Cracking limits, structural design), crossing structures (Culverts, Syphons, Aqueducts, Short span Bridges, weir, regulators), Tail escapes, Construction methods.										
References	• Novak, P., Moffat, A. I. B., Nalluri, C. & Narayanan, R. Hydraulic Structures, Fourth Edn, Spon, London, 2007, ISBN 9780415386265 • S. K. Sharma. design of irrigation structures, RSM Press, ISBN: 8121903297, 9788121903295										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 364	Coastal Engineering	CIV 162	3	2	0	2	4	30	30	0	40
Course Contents	Waves and current movements- stability of shoreline- erosion and sedimentation in unstable shoreline- shore protection structures- modifying the wave property - Revetments of shoreline- theoretical and empirical equations representing sediments movements in marine structure zones- sand nourishment. Coastal water level fluctuations. Mechanics of wave motion. Beach profiles. Surf dynamics and sediment transport. Design wave characteristics. Wave forces on cylinders. Morison equation. Wave forces on vertical walls. Effects of approach angle and non- verticality, Breakwater design.										
References	Basic coastal engineering, by Sorensen R.M., Springer (2006), ISBN: 0387233326, 9780387233321										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 371	Sanitary Engineering	CIV 272	3	2	2	0	4	10	30	20	40
Course Contents	Introduction, sources, types and characteristics of municipal wastewater, Municipal wastewater collection and transportation, Preliminary treatment of municipal Wastewater: deceleration chamber, screen and grit chamber, Primary treatment of municipal wastewater, Secondary treatment of municipal wastewater: activated sludge process, trickling filter process, rotating biological contactor, aerated lagoon and oxidation pond, Sludge treatment & disposal: thickening, stabilization and dewatering.										
References	• Metcalf & Eddy l AECOM (2014) Wastewater Engineering, Treatment and Resource Recovery, ISBN 978-0-07-340118-8 • Sewerage Prof. Dr. M. Basiouny • Lectures presentations • محطات الرفع - الصرف الصحى- الكود المصرى- • أعمال المعالجة- الصرف الصحى - الكود المصرى-										
Laboratory	• Determine PH, Temperature, Total Solids (TS), Chloride, Nitrogen, Phosphorus, • Heavy Metals, Biochemical Oxygen Demand (BOD), Chemical Oxygen • Demand (COD), Dissolved Oxygen (DO), total bacteria account and Total coliform.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 372	Advanced Sanitary Engineering	CIV 371	3	2	0	2	4	30	30	0	40
Course Contents	Nitrogen removal and recovery – Phosphorous Removal and recovery - Membrane filtration - Adsorption - Ion exchange - Reverse osmosis - Air and flotation - Wastewater reuse.										
References	Metcalf & Eddy l AECOM (2014) Wastewater Engineering, Treatment and Resource Recovery, ISBN 978-0-07-340118-8										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 381	Highway Engineering I	CIV 142 CIV 231 CIV 282	3	2	2	0	4	10	30	20	40
Course Contents	Geometric design: Functional Classification of Roads & Cross Section Elements, sight distance, Vertical Alignment, Horizontal Alignment. Structural design: Pavement types and components - Subgrade soil classification - Subgrade soil strength- Soil compaction - Soil stabilization - Stresses in flexible pavement - Flexible pavement design - Testing and specifications of road aggregates - Testing and specifications of bituminous materials - Hot mix asphalt concrete characteristics and design.										
References	• Traffic and Highway Engineering, Nicholas Garber and Lester Hoel, Fifth Enhanced SI Edition, CENGAG Learning, 2020, ISBN-13: 978-1-337-63104-4. • AASHTO, A Policy on Geometric Design of Highways and Streets "Green Book", 7th Edition, 2018, ISBN-13: 978-1560516767. • Pavement Analysis and Design, Yang Huang, Second International Edition, Pearson, 2012, ISBN-13: 978-0-13-272610-8. • Hot Mix Asphalt Materials, Mixture Design and Construction, E. Ray and Prithvi S. Kandhal and Freddy L. Roberts and Y. Richard Kim and Dah-Yinn Lee and Thomas W. Kennedy Brown , Third Edition, National Asphalt Pavement Association Research and Education Foundation, 2009, ISBN-13 : 978-0914313021 • الكود المصرى للطرق – 2020.										
Laboratory	• CBR Test, and Plate Loading Test • Tests of bituminous materials • Hot mix asphalt concrete design (Marshall Method)										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 382	Airport Engineering	CIV 381	3	2	0	2	4	30	30	0	40
Course Contents	Airport planning - Aircraft characteristics related to airport design - Airport configuration - Airport airside capacity and delay - Geometric design of the airfield – Planning and design of the terminal area - Structural design of airport pavements - Airport lighting, marking, and signing - Airport drainage.										
References	• Airport Design and Operation, ANTONI´N KAZDA & ROBERT E. CAVES, Emerald Group Publishing Limited, Third Edition, 2015, ISBN: 978-1-78441-870-0. • Planning and Design of Airports, Robert Horonjeff, Francis X. McKelvey, William J. Sproule, and Seth B. Young, Fifth Edition, Mc Graw Hill, 2010, ISBN-13: 978-0071446419. • Airport Engineering Planning and Design, Subhash C. Saxena, CBS Publishers & Distribution, India, First Edition, 2008, ISBN: 978-81-239-1550-0										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 384	Railway Engineering	CIV 282	3	2	0	2	4	30	30	0	40
Course Contents	Introduction to Railways Engineering, Urban and Sub-urban design of railways, Vertical and horizontal curves- rails design- wood and concrete sleepers design - stresses in gravels section - railways intersections - signs and design of control stations; Economical and environmental effect of railways										
References	• Practical railway engineering, by Clifford F. Bonnett, Imperial College Press; Distributed by World Scientific Pub 2005, ISBN: 1860945155, 9781860945151 • Railway Engineering, by Satish Chandra, M.M. Agarwal, 2nd edition 2013, ISBN-10: 019808353X.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 398	Senior Design Project I	*	2	0	4	0	4	50	0	0	50
Course Contents	Topics are selected by groups of students according to their area of interest upon advisor approval. Projects address solutions to open-ended applications using an integrated engineering approach.										
References	According to the selected project										
Laboratory	According to the selected project										

* The student can register the senior design project course after passing 70% of the program cr. hrs, i.e., 112 Cr. Hr. + completion of the prerequisite courses of the project.

Code	Course Name	Pre-req.	Credit Hours	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 401	Construction Engineering & Management	CIV 300 *	2	2	0	1	3	30	30	0	40
Course Contents	Plan and manage construction processes, address construction defects, maintain safety issues for construction and materials deal with biddings and financial issues including project insurances. Acquire knowledge and understanding of project management and assess the economical environmental impact of construction projects. The ability to prepare the bill of quantities for any specified project. The preparation and calculation of the on-going works quantities. The ability to manage construction project.										
References	• A Guide to the Project Management Body of Knowledge (PMBOK® Guide), by Project Management Institute, Sixth Edition, 2017, ISBN-13: 978-1628251845. • Construction process planning and management, Sidney M. Levy, Elsevier publisher, 2010, ISBN: 978-1-85617-548-7.										
Used in Program	Civil & Architecture Engineering Program			Semester	9						

* Prerequisite for Civil Engineering Program Only

Code	Course Name	Pre-req.	Credit Hours	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 403	Construction project specifications, bids, and contracts	CIV 300	3	2	0	2	4	30	30	0	40
Course Contents	Participants in a construction contract. Contract definition. Types of contracts; formation principles of a contract, performance or breach of contractual obligations. Analysis and comparison of the different kinds of construction contracts. Bidding logistics. Legal organizational structures. Different types and uses of specifications. Different forms of contracts utilized in construction.										
References	Construction process planning and management, Sidney M. Levy, Elsevier publisher, 2010, ISBN: 978-1-85617-548-7.										

Code	Course Name	Pre-req.	Credit Hours	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 405	Value Engineering in the Construction Industry	CIV 300	3	2	0	2	4	30	30	0	40
Course Contents	The value concept: history, definitions, application to the construction industry, incentive provisions in construction contracts, factors to be considered, application to design. Value engineering methodology: information phase, speculative phase, analytical phase, proposal phase, and final report phase. Value engineering study procedures: objective, selecting the input required, required documentation, life cycle cost methodology.										
References	• Value Engineering Practical Applications for Design, Construction, Maintenance & Operations, Alphonse Dell ISOLA, RSMeans, 1997, ISBN: 0-87629-463-8. • Value Engineering Manual, By West Virginia Department of Transportation Division of Highways Engineering Division, Printed By: Wvdoh Office Services Division, January 1, 2004.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 407	Repair and Strengthening of Concrete Structures	CIV 304	3	2	0	2	4	30	30	0	40
Course Contents	Restoration style design - Specifications and selection of restoration materials (Concrete, cemented materials, Epoxy, FRP and others) - Concrete roof repair - Crack repair - Restoration and strengthening concrete elements (Columns, Beams, Slabs, Connections, Concrete walls, and Foundations)- Restoration and strengthening of reinforced concrete structures using fiber-reinforced polymers (FRP)-Applications and field examples.										
References	El-Kasaby, E. A., Repair of concrete structures, Dar Al-Kutub Al-Almia, Cairo, 2nd Ed., (19441/2015), ISBN 978-977-726-140-1, 2016.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 421	Modelling of Structures	CIV 322	3	2	2	0	4	30	30	0	40
Course Contents	General derivation of finite element equilibrium equations - General coordinate models for specific problem (one dimensional element - Plane stress/strain elements) - Lumping of structural properties and loads - Calculation of stresses and assessment of error - formulation of bar Element - Formulation of isoperimetric continuous elements: quadrilateral and triangular elements - Formulation of structural elements: beams - axisymmetric and plate bending elements - Numerical integration: Gauss formula (one dimension integration) - Integration in two dimensions- Computer Applications using ANSYS Engineering Simulation Software.										
References	• G. Ramamurty, " Applied Finite Element Analysis", New Delhi: 2nd Edition, I.K. Inc, 2010, ISBN-13: 978-9380578453 • George R. Buchanan," Schaum's Outline of Finite Element Analysis", 2nd Edition, United State of America, McGraw Hill Inc., 2015 • Saeed Moaveni, "Finite Element Analysis: Theory and Application with ANSYS", 4th Edition, Pearson Global Edition, 2015, ISBN 13: 978-0-273-77430-3.										
Laboratory	Computer Applications using ANSYS Engineering Simulation Software										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 431	Computer Application in Geotechnical Engineering and Foundations	CIV 331	3	2	2	0	4	30	30	0	40
Course Contents	Introduction to Design Geotechnical problems and Foundations by Modern Methods - Material Modelling (Definition of Stresses – Definition of Strains – Elastic and Plastic Strains) – Soil Modelling (Mohr-Coulomb Model – Hardening Soil Model) - Numerical Analysis of Shallow and Deep Foundations – Computer Applications Examples using Modern Programs (Raft – Piles – Retaining Structure).										
References	• El-Kasaby, E. A., Engineering of Surface Foundations, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (19440/2015), ISBN 978 – 977 – 726 – 139 – 5, 2015. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Pijush Samui; Sunita Kumari; Vladimir Makarov; Pradeep Kurup, Modeling in Geotechnical Engineering, 1st Ed., ISBN 978 - 012- 821 – 205 – 9, 2021. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 434	Soil Mechanics & Foundations	CIV 152	3	2	2	0	4	10	30	20	40
Course Contents	The course aims to study soil characteristics and mechanics, and the selection and design of foundations: Soil Properties - Soil Classification - Soil Compaction - Stresses in Soil - Settlement of Soil - Lateral Earth Pressure - Shallow Foundations (Isolated Footing – Rectangular Footing) – Deep Foundations (Piles – Pile Caps).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Engineering of Surface Foundations, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (19440/2015), ISBN 978 – 977 – 726 – 139 – 5, 2015. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Soil Mechanics Laboratory Manual, Oxford University Press, 9th. Ed., ISBN 978 – 019 – 020 – 966 – 7, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										
Laboratory	Specific Gravity Determination, Atterberg Limits (Liquid Limit – Plastic Limit – Shrinkage Limit). Atterberg Limits (Liquid Limit – Plastic Limit – Shrinkage Limit), Grain Size Distribution - Coarse Grained Soils. (Sieve Analysis), Grain Size Distribution - Fine Grained Soils (Hydrometer Analysis), Determination of Natural Unit Weight of Soil (Sand Bottle Test - Core Cutter Test).										
Used in Program	Architecture Engineering Program			Semester			9				

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 441	Remote Sensing and Geographical Information System	CIV 241	3	2	2	0	4	30	30	0	40
Course Contents	Introduction to geographic information systems - remote sensing technologies - Active & passive remote sensing - Data structures – Map projections & coordinate systems - Processing of digital geographic information - Creation of digital elevation models – Visualization - Mapping of water and environmental features – Soil and land use mapping - Terrain analysis for hydrological and hydraulic modelling - Production of thematic maps - GIS as a decision support tool - Exercise and assignment.										
References	• Lillesand, T. M., Kiefer, R. W., and Chipman, J. W., (2007), "Remote Sensing and Image Interpretation', 6th ed. Madison: John Wiley & Sons. - ISBN: 978-1-118-34328-9 • Bonham-Carter, G.F., (1994), " Geographic Information Systems for Geoscientists: Modelling with GIS", Geological Survey of Canada, Love Printing Service Ltd, Ontario, Canada - eBook ISBN: 9780080571805. • Principles of geographical information systems for land resources assessment. P. A. Burrough. Publisher Oxford University press 1986 (paperback) (193 pp) ISBN 0 19 854592 4										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 443	Photogrammetry by Drones	CIV 241	3	2	2	0	4	30	30	0	40
Course Contents	Photogrammetry principles - Classifications of Photogrammetry according to the purpose - Classification of the Photogrammetry according to the sensor location - Space photogrammetry - Aerial Photogrammetry - Terrestrial Photogrammetry - Close Range Photogrammetry (CRP) - UAV Photogrammetry - UAV Classification - UAV images processing techniques and algorithms -Structure from motion (SFM).										
References	• Gruen, Armin, Baltsavias, Emmanuel, Henricsson, O. (Eds.) - Automatic Extraction of Man-Made Objects from Aerial and Space Images (II) - ISBN 978-3-0348-8906-3 • Faig, W. (1985), Lecture Notes on Aerial Triangulation and Digital Mapping, Monograph 10, School of Surveying, The University of New South Wales, Kensington, N.S.W., Australia – ISBN 0858390434 • Falkner, E.; Morgan, D., 2002. Aerial Mapping: Methods and Applications, 2nd ed.; CRC Press: Boca Raton, FL, USA - ISBN 1-56670-557-6										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 451	R.C. Structures Modelling	CIV 352	3	2	2	0	4	30	30	0	40
Course Contents	Analysis and Design of Post-Tension Slabs using commercial software programs. Modeling of Slab edges, opening, supporting elements. Loads input, tendon profiling, material properties, anchorage properties, dead and live tendon ends. Prestress loss data input. Load combinations. Check of Punching, shear, and deflection. Reinforcement detailing.										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018. • Prestressed Concrete: 5th Edition, Edward G. Nawy, ISBN: 978-0136081500, 2009. • Design of Prestressed Concrete, Arthur H Nilson, 2nd Edition, 1991. • Software programs manual.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 461	Inland Navigation	CIV 162	3	2	0	2	4	30	30	0	40
Course Contents	Natural phenomena; wind, waves, Currents and tide - Vessels' specifications and movement - Planning of inland navigation projects Design of navigation channels cross section - Master plan of inland ports - Berthing facilities (quay walls) - Repairing facilities - Dredging and maintenance of navigation channels - Environmental impact of inland navigation.										
References	• Inland Navigation: Channel Training Works. Task Committee on Inland Navigation of the Waterways Committee of the Coasts, Oceans, Ports, and Rivers Institute of ASCE Edited by Thomas J. Pokrefke, P.E. ISBN: 978-0-7844-1253-4ISBN (PDF): 9780784477014 • https://doi.org/10.1061/9780784412534.fm Published online: May 06, 2013 • U. S. Army Corps of Engineers. Shore Protection Manual, 1977.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 463	Hydraulic Modelling	CIV 162	3	2	2	0	4	30	30	0	40
Course Contents	Governing Laws: Continuity principle , Momentum principle , Inertia forces, Momentum equations , Euler equation, Navier-Stokes equations , Bernoulli equation – 1D Channel Flow: Steady− Saint Venant equation for unsteady flow - Derivation of St Venant equation - Kinematic wave approximation - Applications of unsteady flow equations and solution methods- 2D and 3D Shallow Water Equations: Depth-averaged shallow water equations - Limit cases for depth-averaged flow and for 3D flow - Numerical models - Application software.										
References	• Computer Applications using ANSYS Engineering Simulation Software • Le Mehaute, B. (1976). An Introduction to Hydrodynamics and Water Waves, Springer Verlag, New Work. https://doi.org/10.1007/978-3-642-85567-2 eBook ISBN: 978-3-642-85567-2										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 471	Environmental Engineering	-	3	2	0	2	4	30	30	0	40
Course Contents	Introduction to environmental engineering, Philosophy of Environmental Controls – Emissions Control – Climate change – Environmental Impact Assessment – Sustainability – Sustainable water supply – Sustainable solid waste management – Nature and Sources of Air Pollution, Air: Quality, Environmental impact of Air pollution. Soil: Quality, Environmental impact of Soil pollution, Environmental laws and its applications.										
References	• US Environmental Protection Agency • Introduction to Environmental Engineering by Mackenzie Davis, David Cornwell, McGrawHill, Fifth Edition, 2012 • Environmental Engineering: Designing a Sustainable Future (Green Technology), by Anne E. Maczulak, Facts on File 2009, ISBN: 9780816072002, 0816072000, 9781438127477										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 473	Modelling of Water & Wastewater Networks	CIV 371	3	2	2	0	4	30	30	0	40
Course Contents	Modelling of water distribution systems, Analysis and design of water networks using computer applications, modelling of sewer systems, Analysis and design of Sewer Networks using computer applications, Applications										
References	• Haestad Methods Water Solutions, "Advanced Water Distribution Modeling and Management", Haestad, 2003 • Haestad Methods Water Solutions, "Wastewater Collection System Modeling and Design", Bentley institute press, 2007 • Different software package user guide manuals • U.M. Shamsi, "GIS Applications for Water, Wastewater, and Stormwater Systems ", CRC Press, 2005, ISBN 9780849320972. • Staff lectures notes										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 481	Highway Engineering II	CIV 381	3	2	0	2	4	30	30	0	40
Course Contents	Geometric design: At-grade intersection design - Interchange design - Capacity and level of service analysis on basic freeway and multilane highway segments - Capacity and level of service analysis of weaving, merge and diverge segments on freeways and multilane highways - Highway traffic safety. Structural design: Stresses in rigid pavement - Rigid pavement design - Asphalt concrete mix planet - Pavement layers construction - Pavement maintenance - Drainage.										
References	• Traffic and Highway Engineering, Nicholas Garber and Lester Hoel, Fifth Enhanced SI Edition, CENGAG Learning, 2020, ISBN-13: 978-1-337-63104-4. • Traffic Engineering, Roger P. Roess - Elena S. Prassas and William R. McShane, Fifth Edition, Pearson, 2019, ISBN-13: 978-9353434854. • AASHTO, A Policy on Geometric Design of Highways and Streets "Green Book", 7th Edition, ISBN-13: 978-1560516767. • Pavement Analysis and Design, Yang Huang, Second International Edition, Pearson, 2012, ISBN-13: 978-0-13-272610-8. • Hot Mix Asphalt Materials, Mixture Design and Construction, E. Ray and Prithvi S. Kandhal and Freddy L. Roberts and Y. Richard Kim and Dah-Yinn Lee and Thomas W. Kennedy Brown , Third Edition, National Asphalt Pavement Association Research and Education Foundation, 2009, ISBN-13 : 978-0914313021 • الكود المصرى للطرق – 2020.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 483	Computer Application in Transportation Engineering	CIV 381	3	2	2	0	4	30	30	0	40
Course Contents	This course focuses on the fundamentals behind some of the most popular computer software packages used in the planning, design, operations, and management of transportation systems. Topics includes: highway planning and design, pavement design, signal optimization, forecasting of traffic flows and passenger volumes, simulation of traffic and transit systems, design and evaluation of Intelligent Transportation Systems.										
References	The manual of the used software.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 499	Senior Design Project II	CIV 398	3	1	4	0	5	50	0	0	50
Course Contents	Topics are selected by students according to their area of interest upon advisor approval. Student deals with the analysis and design of a complete project using the skills he gained during his study. Project report presented by the student should include the details of the analysis and design satisfying the concerned codes requirements, the computer applications as well as the experimental work, when necessary, in addition to the technical engineering drawing of his design.										
References	According to the selected project										
Laboratory	According to the selected project										

Code	Course Title	Pre-req	Cr. Hrs.	Ct Hrs				Assessment			
				Lec	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 111	Differential Equations	BES 012	3	2	0	2	4	30	30	-	40
Course Content	Ordinary differential equations (ODEs): Classification and types of solutions of ODEs. Solution of first order ODEs - Applications of ODEs (Newtons law of cooling, electric circuits) - Solution of nth order ODEs (homogeneous and non-homogeneous) - System of first order linear differential equations - Series solution of differential equations- Laplace transforms and inverse Laplace transforms with applications - Fourier series with applications. Gamma and Beta functions Partial Differential Equations (PDEs): Classification and types of solutions of PDEs. Applications of PDEs. Solution of linear PDEs with constant coefficients, solution of some initial-boundary value problems. Solution of PDEs by Laplace Transforms.										
References	• Morris Tenenbaum, Harry Pollard, "Ordinary Differential Equations: An Elementary Textbook for Students of Mathematics, Engineering, and the Sciences", Dover Publications, Last Edition. • Wei-Chau Xie, Differential Equations for Engineers, CAMBRIDGE UNIVERSITY PRESS, 2010.										

Code	Course Title	Pre-req	Cr. Hrs.	Ct Hrs				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 112	Numerical Analysis	BES 111	3	2	2	0	4	10	30	20	40
Course Content	Numerical in general: Errors, norms, Numerical solution of a system of linear and nonlinear equations. matrix eigenvalues, least square method (Curve fitting), Interpolations, Numerical differentiation and integration. Numerical ODEs and PDEs: methods for the solution of initial value problems in 1st order ODEs and higher order ODEs, Finite difference methods for boundary value problems in ODEs and initial-boundary value problems for PDEs (Elliptic and parabolic PDEs)- Lab simulations of engineering applications										
References	• R W Hamming, "Numerical Methods for Scientists and Engineers", Courier Dover Publications, Last Edition. • Steven C. Chapra, "Applied Numerical Methods with MATLAB for Engineers and Scientists", Mcgraw-Hill, 3rd edition. • Nita H. Shah, Numerical Methods with C++ Programming, PHI Learning, 2008.										
Laboratory	Lab simulations by software's as (C++, Matlab, Python,…)- Simulating practical technical problems- linear equations due to electric circuits , truss and spring mass systems. - Electric charge calculations- Nonlinear structural problems- Deflection of nonlinear springs- Calculating the shrinkage of a trunnion- Finding the longitudinal Young's modulus -Estimating voltage drop on a resistor- Calculating the work done by stretching a string- Simulating equations due to the fluid continuum problems, DC motor speed control problems- interpolation and fitting for signals and voltage current relations- population growth calculations- Fluid flow rate calculations- Distributed wind force problems										

Code	Course Title	Pre-req	Cr. Hrs.	Ct Hrs				Assessment			
				Lec	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4	10	30	20	40
Course Content	Probability: Obtaining Data - Probability models: mathematical, deterministic model. Probability theory concepts. - Discrete Distributions: Binomial and Poisson distribution. Continuous Distributions: Normal and Exponential Distribution. - Joint distributions. Statistics and Estimation: central point theorem, Single and multiple confidence interval, Prediction interval, tolerance interval - Hypothesis testing, - Inferences on the mean and variance of Normal distribution, Inference of two samples. – Simple and multiple Linear Regression and Correlation. - Applications involving uniform, Gaussian. Markov chains - Queueing Theory - Course examples are drawn from signal processing, system reliability, data science, wireless communications, civil engineering, and mechanical engineering - Lab simulations of engineering applications.										
References	• R. E Walpole, R. H. Myers, “Probability and Statistics for Engineers and Scientists", Macmillan Publishing, Last Edition. • David Levine, Patricia Ramsey , Robert Smidt, “Applied Statistics for Engineers and Scientists: Using Microsoft Excel & Minitab”, First Edition, 2000.										
Laboratory	Lab simulations by software’s as (Excel, Matlab, Python,…)- Exploratory data analysis and data transformation (Tabulated data summaries and statistics, Histograms, Box and Correlation plots, Computation of means, variances, etc, Missing data imputation)- Simple random sampling with and without replacement- Stratified random sampling- Simulating Bernoulli process and Poisson distribution - Simulating Markov chains applications-Binary and sequential hypothesis testing and gambler's ruin -Gaussian Mixture Models, clustering and anomaly detection- Regression models and inference- Time series forecasting and ARIMA models.										

Code	Course Title	Pre-req.	Cr. Hrs.	Ct Hrs				Assessment			
				Lec	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 148	Water Chemistry	BES 041	3	2	2	1	5	10	30	20	40
Course Contents	This course aims to provide an introduction of equilibrium chemistry principles in aquatic systems. This course is designed for engineering students who are often required to understand the composition of solutions and direction of changes during treatment or in environmental systems. By completion of the course, the student will be able to interpret and communicate results related to water quality. Therefore the course syllabus includes the following topics: equilibrium principles of acids-bases, dissolution-precipitation, titration, gas-liquid equilibrium, oxidation-reduction, complexation and water quality analysis and quality control.										
References	- Sawyer, McCarty & Parkin, Chemistry for Environmental Engineering, McGraw Hill, 2003 - Stumm & Morgan, aquatic Chemistry. Third edition, John Wiley&Sons. 1995										
Laboratory	- Acid – base titration, Total hardness, Total alkali, conductivity, Total dissolved solids										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lect.	Lab.	Tut.	Sum	St. Act.	MT	PE/ OE	Final
ARC 217	Architectural Engineering	CIV 101	3	2	0	2	4	30	30	0	40
Course Contents	The course focuses on the relation between building materials and the related adequate construction systems. Students study the basic elements of the building (roofs - floors - walls) and understand. The architectural and services elements of buildings (Function - Finishes - Building materials - Stairs - Elevators). This course provides the students with the fundamental skills and understanding the architectural drawings (Axes - Interior and exterior dimensions - Finishes tables…).										
References	• Ching, Francis D.K., Building Construction Illustrated, Van Nostrand Reinhold, 2008, ISBN-13: 978-0470087817. • Highfield, David, Refurbishment and Upgrading of Building, London: E&FN Spon, 2000, ISBN13: 978–0–203–87916–0. • Hardy, Steve, Time – Saver, Details for Roof Design, New York: McGraw-Hill,1997, ISBN-13: 978-0070263680. • McKay W.B., Building Construction, Volume 1, Longman, 1971, ISBN-13: 978-0582422155.										
Used in Program	Civil Engineering Program					Semester		5			

Program# 8 Civil Engineering Program

Program Description

Students completing the Civil Engineering program at Benha faculty of engineering are awarded with a Bachelor of Science in Civil Engineering degree. Civil Engineering Program provides the undergraduate education and the necessary skills required for a career as a civil engineer or to pursue graduate studies in relevant fields. Students awarded with Bachelor of Science in Civil Engineering can qualify and practice as Professional Civil Engineer (PE) after fulfilling the experience and exam requirements of the licensure. Our well-rounded curriculum emphasizes the fundamentals that integrate both established and cutting-edge civil engineering principles, methods, tools, and materials. The engineering courses are designed around real-life examples in connection with the practices in the industry so that students can easily relate the theories with practice. The humanity courses at Benha faculty of engineering helps our students to supplement their engineering education and training with communication skills, ethic values, and social and environmental awareness. The small class sizes within the Engineering Program allows student-centric and individualized learning environment.

Basic Information

Program Vision

The Civil Engineering Program strives to graduate qualified engineers, produce recognized research, and provide professional societal service locally and internationally.

Program Mission

The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.

Program Objectives

The objectives of the Civil Engineering Program are to enable its graduates to:

- **PO1.** Apply a wide spectrum of engineering knowledge, science and specialized skills with analytic, critical and systemic thinking to identify and solve engineering problems in real life situation.
- **PO2.** Behave professionally and adhere to engineering ethics and standards and work to develop the profession and the community and promote sustainability principles.
- **PO3.** Work in and lead a heterogeneous team and display leadership qualities, business administration, and entrepreneurial skills.
- **PO4.** Use techniques, skills, and modern engineering tools necessary for engineering practice.
- **PO5.** Master self-learning and life-long learning strategies to communicate effectively in academic/professional fields.
- **PO6.** Design of constructions that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural, and societal considerations.
- **PO7.** Incorporate economics and business practices including project risk and change management into the practice of engineering and to understand their limitations.

Graduates Attributes

According to NARS 2018 the graduate attributes of civil engineering are:

GA1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations.

GA2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.

GA3. Behave professionally and adhere to engineering ethics and standards.

GA4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.

GA5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community;

GA6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles.

GA7. Use techniques, skills and modern engineering tools necessary for engineering practice.

GA8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies.

GA9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.

GA10. Demonstrate leadership qualities, business administration and entrepreneurial skills.

In addition to all engineering graduate attributes defined by NARS 2018, Civil Engineering graduates should be able to:

GA11. Design of constructions systems that meet specified needs with applicable standards.

GA12. Understand the concept of quality control during design and construction, field verification, and review

GA13. Incorporate economic and business practices into engineering projects.

Program Learning Outcomes

According to NARS 2018 the graduate of civil engineering program must be able to:

Level A: General Competencies of Engineering Graduate

PLO1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.

PLO2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

PLO3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.

PLO4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.

PLO5. Practice research techniques and methods of investigation as an inherent part of learning.

PLO6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.

PLO7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.

\

PLO8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

PLO9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

PLO10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.

Level B: Competencies of Civil Engineering Graduate

PLO11. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics, Hydrology and Fluid Mechanics.

PLO12. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors; or any other emerging field relevant to the discipline.

PLO13. Plan and manage construction processes; address construction defects, instability and quality issues; maintain safety measures in construction and materials; and assess environmental impacts of projects.

PLO14. Deal with biddings, contracts and financial issues including project insurance and guarantees.

Faculty Mission vs. Program Mission Matrix

Faculty Mission		Program Mission		
		The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.		
		The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools.	The program focuses on professional practices in civil engineering preparing its graduates for the labor market	Develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership.
Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market, and capable of using and developing modern technology, and providing research in engineering fields to serve society and community.	Benha Faculty of Engineering - Benha University is committed to graduate well prepared engineers equipped with knowledge and skills necessary to compete in labor market		√	
	Capable of using and developing modern technology	√		
	Providing research in engineering fields to serve society and community			√

Program Mission vs. Program Objectives Matrix

Program Mission		Program Objectives						
		PO1	PO2	PO3	PO4	PO5	PO6	PO7
The mission of the civil engineering program is to develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership. The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools. The program focuses on professional practices in civil engineering preparing its graduates for the labor market, societal needs, while equipping them with lifelong learning skills.	The program aims to provide undergraduates with outstanding education opportunities founded on comprehensive engineering fundamentals and coupled with modern engineering tools.	√			√			√
	The program focuses on professional practices in civil engineering preparing its graduates for the labor market		√	√		√	√	
	Develop highly competent professionals, preparing them for positions in civil engineering, continuing education in graduate school, life-long learning, and societal leadership.		√	√		√		

Program Objectives vs. Program Competencies Matrix

Program Objectives	Program Competencies													
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4
PO1	√	√							√					
PO2			√				√							
PO3							√	√	√					
PO4				√				√		√				
PO5					√			√		√				
PO6						√					√	√	√	
PO7			√						√					√

Program Objectives vs. Graduate Attributes Matrix

Program Objectives	Graduate Attributes												
	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12	GA13
PO1	√	√											
PO2			√		√	√							
PO3				√						√			
PO4							√						
PO5								√	√				
PO6											√	√	
PO7													√

Career Prospects

Graduates of the Civil Engineering Program would apply their knowledge and interpersonal skills in careers, both in private and public sectors, to conceive, plan, design, implement, operate and maintain the systems needed to support the physical infrastructure.

Building, construction and maintenance will always be necessary for every country. Civil Engineers with computer skills will be particularly in demand because of the growing usage of computers in areas such as structural analysis and design, transportation system planning and construction management.

Graduates will be able to pursue a variety of career options in worldwide locations due to demands for improvements to civil infrastructure that are ever-present, because of population growth and deterioration of existing systems over time. Several career options include, but not limited to, the following:

1. Survey Engineering
2. Geotechnical Engineering
3. Structural Engineering
4. Hydraulics and Irrigation Engineering
5. Environmental Engineering
6. Transportation, Traffic and Highway Engineering
7. Construction Management Engineering

Requirements of Program Courses

Program Requirements

Requirement		Cr. Hrs.	Ct. Hr.			
			Lec	Lab	Tut	Sum
Benha University Requirements		14	14	0	0	14
Benha Faculty of Engineering Requirements		32	19	14	17	50
Program Requirements	From Basic science	12	8	6	2	16
	Compulsory Courses	84	60	37	24	121
	Elective courses	18	12	4	8	24
Total		160	113	61	51	225

University Requirements of Civil Engineering Program

Lists of Humanities Courses of Civil Engineering Program

Code	Course	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
UHS 101	Foreign Language	-----	2	2	0	0	2
UHS 102	Information and Communication Technology	-----	2	2	0	0	2
UHS 103	Societal Issues	-----	2	2	0	0	2
UHS 104	Professional Ethics	-----	2	2	0	0	2
UHS XXX	Humanities Elective I	-----	2	2	0	0	2
UHS XXX	Humanities Elective II	-----	2	2	0	0	2
UHS XXX	Humanities Elective III	-----	2	2	0	0	2
Total			14	14	0	0	14

Lists of Electives Humanities Courses of Civil Engineering Program

Humanities Elective		Code	Course
I	Entrepreneurship Courses	UHS 201	Principles of Entrepreneurship and Project Management
		UHS 203	Human Resources Management
II	Personal and acquired skills courses	UHS 301	Communication and Presentation Skills
		UHS 302	Leadership Skills
III	Scientific research and analysis courses	UHS 801	Research Methodologies
		UHS 803	Thinking Skills

Basic Science Requirements of Civil Engineering Program

CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
BES 011	Mathematics I	-----	3	2	0	2	4
BES 012	Mathematics II	BES 011	3	2	0	2	4
BES 111	Differential Equations	BES 012	3	2	0	2	4
BES 112	Numerical Analysis	BES 111	3	2	2	0	4
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4
BES 041	General Chemistry	-----	4	3	2	1	6
BES 148	Water Chemistry	BES 041	3	2	2	0	4
BES 141*	Pollution and Industrial Safety	BES 041	2	2	1	0	3
BES 031	Physics I	-----	3	2	2	1	5
BES 032	Physics II	-----	3	2	2	1	5
Total			30	21	13	9	43

* Course teaching is shared between the Basic Engineering Science Department and Civil Engineering Department.

Program Requirements

Lists of Compulsory Courses (96 Cr. Hrs.)

CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
BES 111	Differential Equations	BES 012	3	2	0	2	4
BES 112	Numerical Analysis	BES 111	3	2	2	0	4
BES 148	Water Chemistry	BES 041	3	2	2	0	4
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4
Total from Basic Science			12	8	6	2	16
CIV 101	CAD for Civil Engineering	MEC 014	2	1	3	0	4
CIV 111	Properties and Testing of Materials	BES 022	3	2	2	0	4
CIV 113	Technology of Building Materials	BES 041	2	2	1	0	3
CIV 114	Concrete Technology	CIV 113	3	2	2	0	4
CIV 121	Structure Analysis I	BES 021	3	2	0	2	4
CIV 122	Structure Analysis II	CIV 121	3	2	0	2	4
CIV 142	Surveying for Engineers I	BES 012	3	2	2	0	4
CIV 161	Fluid Mechanics	BES 031	2	2	1	0	3
CIV 162	Hydraulics	CIV 161	2	2	1	0	3
ARC 217	Architectural Engineering	CIV 101	2	1	0	2	3
CIV 221	Structure Analysis III	CIV 122	3	2	0	2	4
CIV 222	Design of Metallic Structures I	CIV 122	3	2	0	2	4
CIV 231	Soil Mechanics	CIV 111	3	2	2	0	4
CIV 232	Geotechnical Engineering and Foundations	CIV 231, CIV 251	3	2	2	0	4
CIV 241	Surveying for Engineers II	CIV 142	3	2	2	0	4
CIV 251	Design of R.C. Structures I	CIV 114, CIV 122	3	2	0	2	4
CIV 252	Design of R.C. Structures II	CIV 251	3	2	0	2	4
CIV 261	Hydrology	CIV 162	2	2	0	1	3
CIV 272	Water Supply Engineering	CIV 162	3	2	2	0	4
CIV 282	Traffic and Transportation Engineering	BES 112, BES 211	3	2	2	0	4
CIV 300	Contracts and Legalizations	CIV 222, CIV 252	2	2	0	1	3
CIV 302	Computer Applications in Civil Engineering	ELE 042, CIV 122	2	1	3	0	4
CIV 304	Quality Control and Fundamentals of Repair and Strengthening of Structures	CIV 252, CIV 321	2	2	0	1	3
CIV 306	Engineering Economy	-----	2	2	0	1	3
CIV 321	Design of Metallic Structures II	CIV 222	3	2	0	2	4
CIV 331	Design of Foundations and Earth Retaining Structures	CIV 232	2	2	0	1	3
CIV 351	Design of R.C. Structures III	CIV 252	2	2	0	1	3
CIV 361	Irrigation and Drainage Engineering	CIV 161	2	2	0	1	3
CIV 371	Sanitary Engineering	CIV 272	3	2	2	0	4
CIV 381	Highway Engineering I	CIV 142, CIV 231, CIV 282	3	2	2	0	4
CIV 398	Senior Design Project I	*	2	0	4	0	4
CIV 401	Construction Project & Management	CIV 300	2	2	0	1	3
CIV 499	Senior Design Project II	CIV 398	3	1	4	0	5
Total from Civil Courses			84	60	37	24	121
Total			96	68	43	26	137

* The student can register the senior design project course after passing 70% of the program Cr. Hrs., i.e., 112 Cr. Hrs. + completion of the prerequisite courses of the project.

Lists of Elective Courses (18 Cr. Hrs.)

CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.			
				Lec	Lab	Tut	Sum
Elective I							
CIV 200	Civil Engineering Application I	Completion of 70 Cr. Hrs.	3	2	2	0	4
CIV 202	Civil Engineering Application II		3	2	2	0	4
Elective II							
CIV 312	Modern Construction Materials	CIV 114	3	2	0	2	4
CIV 322	Structure Analysis IV	CIV 221	3	2	0	2	4
CIV 332	Special Topics in Geotechnical Engineering	CIV 331	3	2	0	2	4
CIV 342	Satellite Geodesy	CIV 241	3	2	0	2	4
CIV 344	Underground Utility Survey	CIV 241	3	2	0	2	4
CIV 346	Hydrographic Survey	CIV 241	3	2	0	2	4
Elective III							
CIV 324	Metallic Structures Design III	CIV 222	3	2	0	2	4
CIV 334	Special Topics in Foundations Engineering	CIV 331	3	2	0	2	4
CIV 352	R.C. Structures Design IV	CIV 351	3	2	0	2	4
CIV 362	Design of Irrigation Structure	CIV 162	3	2	0	2	4
CIV 364	Costal Engineering	CIV 162	3	2	0	2	4
CIV 372	Advanced Sanitary Engineering	CIV 371	3	2	0	2	4
CIV 382	Airport Engineering	CIV 381	3	2	0	2	4
CIV 384	Railway Engineering	CIV 282	3	2	0	2	4
Elective IV							
CIV 403	Construction project specifications, bids, and contracts	CIV 300	3	2	0	2	4
CIV 405	Value Engineering in the Construction Industry	CIV 300	3	2	0	2	4
Elective V							
CIV 407	Repair and Strengthening of Concrete Structures	CIV 304	3	2	0	2	4
CIV 461	Inland Navigation	CIV 162	3	2	0	2	4
CIV 471	Environmental Engineering	-----	3	2	0	2	4
CIV 481	Highway Engineering II	CIV 381	3	2	0	2	4
Elective VI							
CIV 421	Modelling of structures	CIV 322	3	2	2	0	4
CIV 431	Computer Application in Geotechnical Engineering and Foundations	CIV 331	3	2	2	0	4
CIV 441	Remote Sensing and Geographical Information Systems	CIV 241	3	2	2	0	4
CIV 443	Photogrammetry by Drones	CIV 241	3	2	2	0	4
CIV 451	R.C. structures Modelling	CIV 352	3	2	2	0	4
CIV 463	Hydraulic Modelling	CIV 162	3	2	2	0	4
CIV 473	Modeling of Water & Wastewater Networks	CIV 371	3	2	2	0	4
CIV 483	Computer Application in Transportation Engineering	CIV 381	3	2	2	0	4
Total			18	12	4	8	24

Proposed Study Plan

Level 0-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS 101	Foreign Language	-----	2	2	0	0	2	2	30	30	0	40	100
UHS 102	Information and Communication Technology	-----	2	2	0	0	2	2	30	30	0	40	100
MEC 011	Engineering Graphics	-----	2	0	0	4	4	2	30	30	0	40	100
BES 011	Mathematics I	-----	3	2	0	2	4	2	30	30	0	40	100
BES 021	Mechanics I	-----	3	2	0	2	4	2	30	30	0	40	100
BES 031	Physics I	-----	3	2	2	1	5	2	10	30	20	40	100
BES 041	General Chemistry	-----	4	3	2	1	6	2	10	30	20	40	100
Sum			19	13	4	10	27						700

Level 0-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS 103	Societal Issues	-----	2	2	0	0	2	2	30	30	0	40	100
MEC 012	Production Engineering	-----	2	1	3	0	4	2	10	30	20	40	100
MEC 014	Computer Aided Drafting	MEC 011	2	1	2	0	3	2	10	30	20	40	100
BES 012	Mathematics II	BES 011	3	2	0	2	4	2	30	30	0	40	100
BES 022	Mechanics II	BES 021	3	2	0	2	4	2	30	30	0	40	100
BES 032	Physics II	-----	3	2	2	1	5	2	10	30	20	40	100
ELE 042	Computer Programming Fundamentals	-----	2	0	2	2	4	2	10	30	20	40	100
Sum			17	10	9	7	26						700

Level 1-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
BES 141	Pollution and Industrial Safety	BES 041	2	2	1	0	3	2	10	30	20	40	100
BES 111	Differential Equations	BES 012	3	2	0	2	4	2	30	30	0	40	100
CIV 101	CAD for Civil Engineering	MEC 014	2	1	3	0	4	2	30	30	40	--	100
CIV 111	Properties and Testing of Materials	BES 022	3	2	2	0	4	2	10	30	20	40	100
CIV 113	Technology of Building Materials	BES 041	2	2	1	0	3	2	10	30	20	40	100
CIV 121	Structure Analysis I	BES 021	3	2	0	2	4	2	30	30	0	40	100
CIV 161	Fluid Mechanics	BES 031	2	2	1	0	3	2	10	30	20	40	100
Sum			17	13	8	4	25						700

Level 1-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS 104	Professional Ethics	-----	2	2	0	0	2	2	30	30	0	40	100
BES 112	Numerical Analysis	BES 111	3	2	2	0	4	2	10	30	20	40	100
BES 148	Water Chemistry	BES 041	3	2	2	0	4	2	10	30	20	40	100
CIV 114	Concrete Technology	CIV 113	3	2	2	0	4	2	10	30	20	40	100
CIV 122	Structure Analysis II	CIV 121	3	2	0	2	4	2	30	30	0	40	100
CIV 142	Surveying for Engineers I	BES 012	3	2	2	0	4	2	10	30	20	40	100
CIV 162	Hydraulics	CIV 161	2	2	1	0	3	2	10	30	20	40	100
Sum			19	14	9	2	25						700

Field Training I													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
FTR 103	Field Training I	Completion of 65 Cr. Hrs.	0	0	0	0	0	Oral	-	-	Pass or fail	-	-

Level 2-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4	2	10	30	20	40	100
ARC 217	Architectural Engineering	CIV 101	2	1	0	2	3	2	30	30	40	--	100
CIV 221	Structure Analysis III	CIV 122	3	2	0	2	4	2	30	30	0	40	100
CIV 231	Soil Mechanics	CIV 111	3	2	2	0	4	2	10	30	20	40	100
CIV 241	Surveying for Engineers II	CIV 142	3	2	2	0	4	2	10	30	20	40	100
CIV 251	Design of R.C. Structures I	CIV 114, CIV 122	3	2	0	2	4	2	30	30	0	40	100
CIV 261	Hydrology	CIV 162	2	2	0	1	3	2	30	30	0	40	100
Sum			19	13	6	7	26						700

Level 2-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
CIV 2XX	Elective I	*	3	2	2	0	4	2	10	30	20	40	100
CIV 222	Design of Metallic Structures I	CIV 122	3	2	0	2	4	2	30	30	0	40	100
CIV 232	Geotechnical Engineering and Foundations	CIV 231, CIV 251	3	2	2	0	4	2	10	30	20	40	100
CIV 252	Design of R.C. Structures II	CIV 251	3	2	0	2	4	2	30	30	0	40	100
CIV 272	Water Supply Engineering	CIV 162	3	2	2	0	4	2	10	30	20	40	100
CIV 282	Traffic and Transportation Engineering	BES 112, BES 211	3	2	2	0	4	2	10	30	20	40	100
Sum			18	12	6	6	24						600

* According to the Course Name

Field Training II													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
FTR 203	Field Training II	Completion of 96 Cr. Hrs.	0	0	0	0	0	Oral	-	-	Pass or Fail	-	-

Level 3-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS XXX	Humanities Elective I	-----	2	2	0	0	2	2	30	30	0	40	100
CIV 321	Design of Metallic Structures II	CIV 222	3	2	0	2	4	2	30	30	0	40	100
CIV 331	Design of Foundations and Earth Retaining Structures	CIV 232	2	2	0	1	3	2	30	30	0	40	100
CIV 351	Design of R.C. Structures III	CIV 252	2	2	0	1	3	2	30	30	0	40	100
CIV 361	Irrigation and Drainage Engineering	CIV 161	2	2	0	1	3	2	30	30	0	40	100
CIV 371	Sanitary Engineering	CIV 272	3	2	2	0	4	2	10	30	20	40	100
CIV 381	Highway Engineering I	CIV 142 CIV 231 CIV 282	3	2	2	0	4	2	10	30	20	40	100
Sum			17	14	4	5	23						700

Level 3-2													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
CIV 300	Contracts and Legalizations	CIV 222 CIV 252	2	2	0	1	3	2	30	30	0	40	100
CIV 302	Computer Applications in Civil Engineering	ELE 042 CIV 122	2	1	3	0	4	2	10	30	20	40	100
CIV 304	Quality Control and Fundamentals of Repair and Strengthening of Structures	CIV 252 CIV 321	2	2	0	1	3	2	30	30	0	40	100
CIV 306	Engineering Economy	-----	2	2	0	1	3	2	30	30	0	40	100
CIV 3XX	Elective II	*	3	2	0	2	4	2	30	30	0	40	100
CIV 3XX	Elective III	*	3	2	0	2	4	2	30	30	0	40	100
CIV 398	Senior Design Project I	**	2	0	4	0	4	Oral	50	0	50	--	100
Sum			16	11	7	7	25						700

* According to the Course Name

** The student can register the senior design project course after passing 70% of the program cr. hrs, i.e., 112 Cr. Hrs. + completion of the prerequisite courses of the project.

Level 4-1													
CODE	Course Name	Pre-requisites	Cr. Hrs.	Ct. Hr.				Final Exam Time	Assessment				
				Lec	Lab	Tut	Sum		SA	MT	PE/ OE	Final Exam	Sum
UHS XXX	Humanities Elective II	-----	2	2	0	0	2	2	30	30	0	40	100
UHS XXX	Humanities Elective III	-----	2	2	0	0	2	2	30	30	0	40	100
CIV 401	Construction Project & Management	CIV 300	2	2	0	1	3	2	30	30	0	40	100
CIV 4XX	Elective IV	*	3	2	0	2	4	2	30	30	0	40	100
CIV 4XX	Elective V	*	3	2	0	2	4	2	30	30	0	40	100
CIV 4XX	Elective VI	*	3	2	0	2	4	2	30	30	0	40	100
CIV 499	Senior Design Project II	CIV 398	3	1	4	0	5	Oral	50	0	50	--	100
Sum			18	13	4	7	24						700

* According to the Course Name

Matching Civil Engineering Program Courses with ABET Requirements

ABET Program Criteria for Civil and Similarly Named Engineering Programs
Lead Society: American Society of Civil Engineers

Civil Engineering Program Courses Required to Cover ABET Criteria				
ABET Criteria		**CODE**	**Course Name**	**Cr. Hrs.**
A minimum of 30 semester credit hours (or equivalent) of a combination of college-level mathematics and basic sciences with experimental experience appropriate to the program.	The curriculum must prepare graduates to apply knowledge of mathematics through differential equations.	BES 011	Mathematics I	3
		BES 012	Mathematics II	3
		BES 111	Differential Equations	3
	At least one additional area of basic science; apply probability and statistics to address uncertainty	BES 112	Numerical Analysis	3
		BES 211	Engineering Statistics and Probability	3
	Chemistry	BES 041	General Chemistry	4
		BES 249	Water Chemistry	3
		BES 141	Pollution and Industrial Safety	2
	Calculus-based physics	BES 031	Physics I	3
		BES 032	Physics II	3
Total				**30**
ABET Criteria		**CODE**	**Course Name**	**Cr. Hrs.**
A minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design and utilizing modern engineering tools.	Analyze and solve problems in at least four technical areas appropriate to civil engineering.	CIV 121	Structure Analysis I	3
		CIV 122	Structure Analysis II	3
		CIV 221	Structure Analysis III	3
		CIV 261	Hydrology	2
		CIV 361	Irrigation and Drainage Engineering	2
		CIV 302	Computer Applications in Civil Engineering	2
		CIV 282	Traffic and Transportation Engineering	3
	Conduct experiments in at least two technical areas of civil engineering and analyze and interpret the resulting data.	CIV 111	Properties and Testing of Materials	3
		CIV 113	Technology of Building Materials	2
		CIV 114	Concrete Technology	3
		CIV 142	Surveying for Engineers I	3
		CIV 241	Surveying for Engineers II	3
		CIV 231	Soil Mechanics	3
		CIV 232	Geotechnical	3

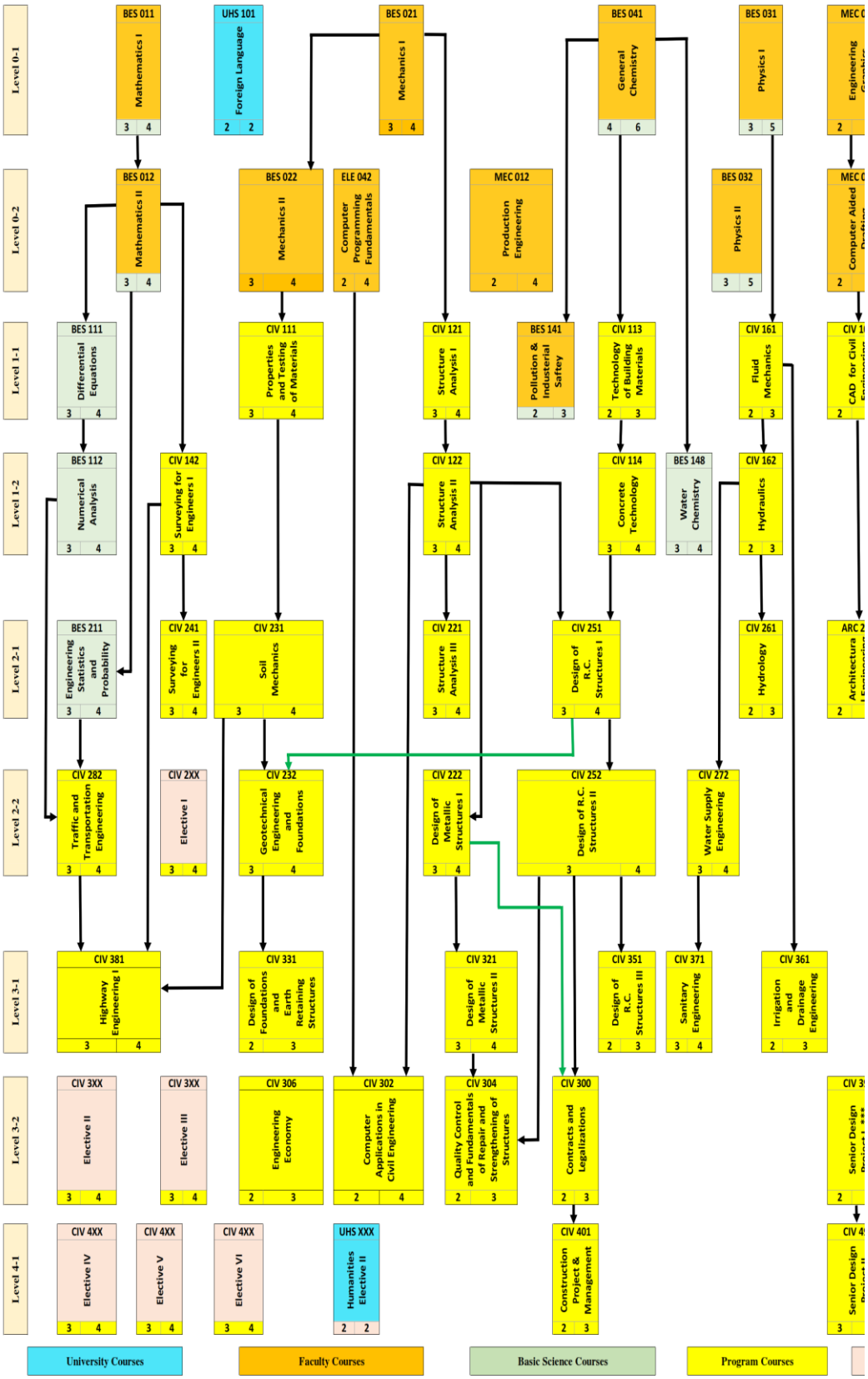
			Engineering and Foundations	
		CIV 161	Fluid Mechanics	2
		CIV 162	Hydraulics	2
	Design a system, component, or process in at least two civil engineering contexts;	CIV 331	Design of Foundations and Earth Retaining Structures	3
		CIV 251	Design of R.C. Structures I	3
		CIV 252	Design of R.C. Structures II	3
		CIV 351	Design of R.C. Structures III	3
		CIV 222	Design of Metallic Structures I	3
		CIV 321	Design of Metallic Structures II	3
		CIV 381	Highway Engineering I	3
		CIV 272	Water Supply Engineering	3
		CIV 371	Sanitary Engineering	3
	Include principles of sustainability in design.	CIV 304	Quality Control and Fundamentals of Repair and Strengthening of Structures	2
		CIV 4XX	Elective V	3
	Explain basic concepts in project management, business, public policy, and leadership.	CIV 300	Contracts and Legalizations	2
		CIV 306	Engineering Economy	2
		CIV 401	Construction Project & Management	2
		CIV 4XX	Elective IV	3
		UHS 103	Societal Issues	2
		UHS XXX	Humanities Elective I	2
		UHS XXX	Humanities Elective II	2
	Analyze issues in professional ethics and explain the importance of professional licensure.	UHS 104	Professional Ethics	2
Total				**91**

Courses Plan and Matrix

Civil Engineering Program Map

								CR	CT
Level 0	UHS 101 Foreign Language 2 2	UHS 102 Information and Communication Technology 2 2	MEC 011 Engineering Graphics 2 4	BES 011 Mathematics I 3 4	BES 021 Mechanics I 3 4	BES 031 Physics I 3 5	BES 041 General Chemistry 4 6	19	27
	UHS 103 Social Issues 2 2	MEC 012 Production Engineering 2 4	MEC 014 Computer Aided Drafting 2 3	BES 012 Mathematics II 3 4	BES 022 Mechanics II 3 4	BES 032 Physics II 3 5	ELE 042 Computer Programming Fundamentals 2 4	17	26
Level 1	BES 141 Pollution & Industrial Safety 2 3	BES 111 Differential Equations 3 4	CIV 101 CAD for Civil Engineering 2 4	CIV 111 Properties and Testing of Materials 3 4	CIV 113 Technology of Building Materials 2 3	CIV 121 Structure Analysis I 3 4	CIV 161 Fluid Mechanics 2 3	17	25
	UHS 104 Professional Ethics 2 2	BES 112 Numerical Analysis 3 4	BES 148 Water Chemistry 3 4	CIV 114 Concrete Technology 3 4	CIV 122 Structure Analysis II 3 4	CIV 142 Surveying for Engineers I 3 4	CIV 162 Hydraulics 2 3	19	25
	FTR 103 Field Training I								
Level 2	BES 211 Engineering Statistics and Probability 3 4	ARC 217 Architectural Engineering 2 3	CIV 221 Structure Analysis III 3 4	CIV 231 Soil Mechanics 3 4	CIV 241 Surveying for Engineers II 3 4	CIV 251 Design of R.C. Structures I 3 4	CIV 261 Hydrology 2 3	19	26
	CIV 2XX Elective I 3 4	CIV 222 Design of Metallic Structures I 3 4	CIV 232 Geotechnical Engineering and Foundations 3 4	CIV 252 Design of R.C. Structures II 3 4	CIV 272 Water Supply Engineering 3 4	CIV 282 Traffic and Transportation Engineering 3 4		18	24
	FTR 203 Field Training II								
Level 3	UHS XXX Humanities Elective I 2 2	CIV 321 Design of Metallic Structures II 3 4	CIV 331 Design of Foundations and Earth Retaining Structures 2 3	CIV 351 Design of R.C. Structures III 2 3	CIV 361 Irrigation and Drainage Engineering 2 3	CIV 371 Sanitary Engineering 3 4	CIV 381 Highway Engineering I 3 4	17	23
	CIV 300 Contracts and Legalizations 2 3	CIV 302 Computer Applications in Civil Engineering 2 4	CIV 304 Quality Control and Fundamentals of Repair and Strengthening of Structures 2 3	CIV 306 Engineering Economy 2 3	CIV 3XX Elective II 3 4	CIV 3XX Elective III 3 4	CIV 398 Senior Design Project I 2 4	16	25
Level 4	UHS XXX Humanities Elective II 2 2	UHS XXX Humanities Elective III 2 2	CIV 401 Construction Engineering & Management 2 3	CIV 4XX Elective IV 3 4	CIV 4XX Elective V 3 4	CIV 4XX Elective VI 3 4	CIV 499 Senior Design Project II 3 5	18	24
	University Req.	Faculty Req.	Basic Science Req.	Program Req.	Elective Req.	CR : Crediet Hour CT : Contact Hour		CR 160	CT 225

Civil Engineering Program Flowchart (Compulsory Courses)



* 65 Credit hours are required as a minimum for registration.

** 96 Credit hours are required as a minimum for registration

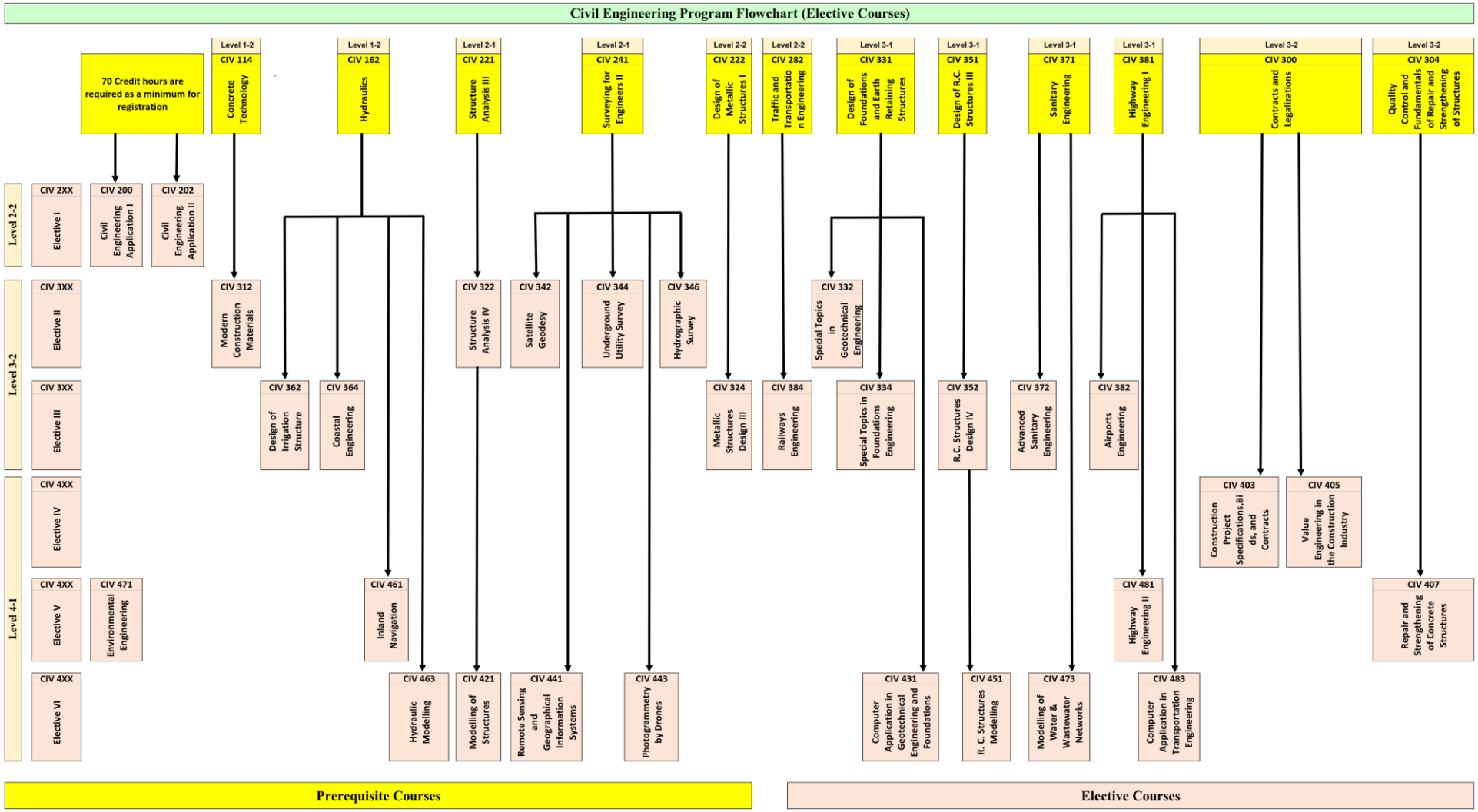
*** The student can register the senior design project course after passing 70% of the program Credit hours, i.e., 112 credit hours + completion of the prerequisite courses of the project.

Civil Engineering Program - Elect

CIV 2XX Elective I 3 4	CIV 200 Civil Engineering Application I 3 4	CIV 202 Civil Engineering Application II 3 4			
CIV 3XX Elective II 3 4	CIV 312 Modern Construction Materials 3 4	CIV 322 Structure Analysis IV 3 4	CIV 332 Special Topics in Geotechnical Engineering 3 4	CIV 342 Satellite Geodesy 3 4	
CIV 3XX Elective III 3 4	CIV 324 Metallic Structures Design III 3 4	CIV 334 Special Topics in Foundations Engineering 3 4	CIV 352 R.C. Structures Design IV 3 4	CIV 362 Design of Irrigation Structure 3 4	Co
CIV 4XX Elective IV 2 4	CIV 403 Construction project specifications, bids, and contracts 3 4	CIV 405 Value Engineering in the Construction Industry 3 4			
CIV 4XX Elective V 3 4	CIV 407 Repair and Strengthening of Concrete Structures 3 4	CIV 461 Inland Navigation 3 4	CIV 471 Environmental Engineering 3 4	CIV 481 Highway Engineering II 3 4	
CIV 4XX Elective VI 3 4	CIV 421 Modelling of Structures 3 4	CIV 431 Computer Application in Geotechnical Engineering and Foundations 3 4	CIV 441 Remote Sensing and Geographical Information Systems 3 4	CIV 443 Photogrammetry by Drones 3 4	

Benha University
Benha Faculty of Engineering

جامعة بنها
كلية الهندسة ببنها
لائحة مرحلة البكالوريوس 2023



Program Learning Objectives to Courses Matrix

Code	Title	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	PLO11	PLO12	PLO13	PLO14	Total
Compulsory Humanities Courses																
UHS 101	Foreign Language								1		1					2
UHS 102	Information and Communication Technology				1						1					2
UHS 103	Societal Issues							1			1					2
UHS 104	Professional Ethics				1	1										2
Elective Humanities Courses																
UHS XXX	Humanities Elective I			1	1											2
UHS XXX	Humanities Elective II								1	1						2
UHS XXX	Humanities Elective III					1					1					2
Basic Science Courses																
BES 011	Mathematics I	1		1												2
BES 012	Mathematics II	1		1												2
BES 111	Differential Equations	1	1													2
BES 112	Numerical Analysis	1	1													2
BES 211	Engineering Statistics and Probability	1	1													2
BES 041	General Chemistry	1	1													2
BES 249	Water Chemistry	1	1		1											3
BES 141*	Pollution and Industrial Safety	1		1	1											3
BES 031	Physics I	1	1													2
BES 032	Physics II	1	1													2
Faculty Requirements Courses																
MEC 011	Engineering Graphics						1		1							2
MEC 012	Production Engineering				1		1									2
MEC 014	Computer Aided Drafting				1				1							2
ELE 042	Computer Programming Fundamentals	1		1												2
BES 021	Mechanics I	1	1													2

BES 022	Mechanics II	1	1													2
FTR 103	Field Training I							1			1					2
FTR 203	Field Training II							1			1					2
Civil Program Compulsory Courses																
		PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**	**PLO9**	**PLO10**	**PLO11**	**PLO12**	**PLO13**	**PLO14**	**Total**
CIV 101	CAD for Civil Engineering				1								1			2
CIV 111	Properties and Testing of Materials		1									1				2
CIV 113	Technology of Building Materials		1									1				2
CIV 114	Concrete Technology		1									1		1		3
CIV 121	Structure Analysis I	1										1				2
CIV 122	Structure Analysis II	1										1				2
CIV 142	Surveying for Engineers I		1			1						1				3
CIV 161	Fluid Mechanics		1									1				2
CIV 162	Hydraulics		1							1		1				3
ARC 217	Architectural Engineering					1			1							2
CIV 221	Structure Analysis III	1										1				2
CIV 222	Design of Metallic Structures I			1	1								1			3
CIV 231	Soil Mechanics		1			1						1				3
CIV 232	Geotechnical Engineering and Foundations			1								1	1			3
CIV 241	Surveying for Engineers II		1			1						1				3
CIV 251	Design of R.C. Structures I			1	1								1			3
CIV 252	Design of R.C. Structures II			1	1								1			3
CIV 261	Hydrology	1										1				2
CIV 272	Water Supply Engineering		1										1			2
CIV 282	Traffic and Transportation Engineering					1							1	1		3
CIV 300	Contracts and Legalizations								1	1				1	1	4
CIV 302	Computer Applications in Civil Engineering		1										1			2
CIV 304	Quality Control and Fundamentals of				1	1				1	1			1		5

	Repair and Strengthening of Structures														
CIV 306	Engineering Economy									1				1	2
CIV 321	Design of Metallic Structures II			1	1								1		3
CIV 331	Design of Foundations and Earth Retaining Structures			1									1		2
CIV 351	Design of R.C. Structures III			1	1								1		3
CIV 361	Irrigation and Drainage Engineering	1											1		2
CIV 371	Sanitary Engineering		1										1		2
CIV 381	Highway Engineering I			1	1								1		3
CIV 398	Senior Design Project I			1	1		1	1	1	1	1	1	1	1	11
CIV 401	Construction Project & Management						1			1				1	4
CIV 499	Senior Design Project II			1	1		1	1	1	1	1	1	1	1	11
Civil Program Elective Courses															
		PLO1	**PLO2**	**PLO3**	**PLO4**	**PLO5**	**PLO6**	**PLO7**	**PLO8**	**PLO9**	**PLO10**	**PLO11**	**PLO12**	**PLO13**	**PLO14**	**Total**
CIV 2XX	Elective I						1					1				2
CIV 3XX	Elective II					1						1				2
CIV 3XX	Elective II												1	1		2
CIV 4XX	Elective IV						1							1	1	3
CIV 4XX	Elective V					1								1		2
CIV 4XX	Elective VI		1									1				2
Total		18	21	15	17	10	7	5	8	8	9	18	17	10	6	170

Courses offered to Civil Engineering Program

The coding system is demonstrated in the following table:

BES X1X	Mathematics Courses offered by Basic Engineering Science Department
BES X4X	Chemistry Courses offered by Basic Engineering Science Department
ARC XXX	Course offered by Architecture Engineering Department
CIV XXX	Course offered by Civil Engineering Department
CIV X0X	Cad, Management, Quality Control, Repair, and Civil Application Courses
CIV X1X	Material courses
CIV X2X	Structural and Metallic courses
CIV X3X	Soil and Foundation Courses
CIV X4X	Surveying Courses
CIV X5X	Reinforced Concrete Courses
CIV X6X	Water Courses
CIV X7X	Environmental Courses
CIV X8X	Transportation Courses
CIV X9X	Graduation Project

The following abbreviations are the legend for the courses:

The following abbreviations are the legend for the courses:	
Lec	Lectures
Lab	Laboratory
Tut	Tutorials
SA	Student Activity
MT	Mid-Term Exam
PE	Practical Exam
OE	Oral Exam

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 101	CAD for Civil Engineering	MEC 014	2	1	3	0	4	30	30	40	--
Course Contents	Application of AutoCAD Program in drawing different types of civil structures (Irrigation structures – Reinforced concrete structures – Steel structures- urban transportation systems).										
References	A Textbook of Engineering Drawing: Along with an Introduction to AutoCAD, International Publishing House, 2015. ISBN 9789384588687										
Laboratory	• Irrigation structures drawing. • Reinforced concrete structures drawing. • Steel structures drawing. • Transportation systems drawing.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 111	Properties and Testing of Materials	BES 022	3	2	2	0	4	10	30	20	40
Course Contents	Stress and strain - Types of tests - Testing machines - Strain gauge devices - Static tension test - Static compression test - Bending test - Shear test - Torsion test - Hardness test - Fatigue test - Impact test - Metals creep teSA										
References	• Mechanics of Materials, James M. Kere & Barry J. Goodno, CENGAGE Learning, ISBN-13: 978-1111577735 / ISBN-10: 1111577730. • Strength of Materials, S. S. Bhavikatti,Vikas, Vicas, ISBN-13: 978-9325971578, ISBN-10: 9325971577. • A Textbook of Strength of Materials, Dr R.K. Bansal, LAXMI PUBLICATIONS (P) LTD, ISBN-10: 9788131808146 / ISBN-13: 978-8131808146. • المواد الهندسية مقاومتها واختبارها (الجزء الأول والجزء الثاني)، ا.د. احمد العريان - ا.د. عبد الكريم عطا • مقاومة واختبار المواد، د. عبد الوهاب محمد عوض - د. إبراهيم على درويش. • المواصفات القياسية المصرية.										
Laboratory	• Static tension teSA • Static compression teSA • Bending teSA • Hardness teSA • Impact teSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 113	Technology of Building Materials	BES 041	2	2	1	0	3	10	30	20	40
Course Contents	Specifications and standard specifications of materials and products - Main properties of engineering materials - Building Rocks - Mineral binding materials (Lime, Gypsum & Cement) - Concrete aggregates - Steel reinforcement - Timber - Bricks – Introduction to fibre reinforced polymers.										
References	• للكود المصري لتصميم وتنفيذ المنشآت الخرسانية – 203. • الملحق الثالث للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (دليل الاختبارات المعملية لمواد الخرسانة). • Building Materials, S. K. Duggal, Routledge, ISBN-10: 8122433790 / ISBN-13: 978-8122433791. • Materials of construction, R.C. Smith, McGraw-Hill, ISBN-10: 0070584761, ISBN-13: 978-0070584761.										
Laboratory	• Specific surface area of cement – Setting time of cement - compressive strength of cement • Sieve analysis of coarse and fine aggregate – bulk density of aggregate – specific • Coarse aggregate crushing value – Los Angles abrasion value of coarse aggregate. • Compression test of bricks.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 114	Concrete Technology	CIV 113	3	2	2	0	4	10	30	20	40
Course Contents	Introduction to concrete as a structural material - Mixing water - Concrete manufacture (Batching - Mixing - Transportation - Placing - Compacting - Surface finishing, Repair and curing) - Properties of fresh concrete (Consistency - Workability - Segregation and bleeding) - Properties of hardened concrete (Strength - Shrinkage - Elasticity - creep) - Durability of concrete - Mix design - Non-destructive testing (Rebound hammer - Ultrasonic Pulse velocity and core) - Concrete admixtures - Special concretes.										
References	• Concrete Technology, AM Neville, JJ Brooks, Longman, ISBN-10: 0273732196, ISBN-13: 978-0273732198. • Properties of Concrete and Structures, P.K. Mehta, Prentice Hall, ISBN-10: 0131671154, ISBN-13: 978-0131671157. • تكنولوجيا الخرسانة" (الجزء الأول والجزء الثاني)، أ.د. أحمد العريان - أ.د. عبد الكريم عطا. • الكود المصري لتصميم وتنفيذ المنشآت الخرسانية- 203. • الملحق الثالث للكود المصري لتصميم وتنفيذ المنشآت الخرسانية (دليل الاختبارات المعملية لمواد الخرسانة).										
Laboratory	• Compacting factor test - Slump teSA • Compressive strength test - Splitting tensile strength test – Modulus of rupture teSA • Rebound hammer test - Ultrasonic Pulse velocity teSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 121	Structure Analysis I	BES 021	3	2	0	2	4	30	30	0	40
Course Contents	Loads and reactions – Stability of structures (external and internal) – Straining actions in Statically determinate structures- Normal stresses – Shear stresses (pure shear, torsional) – Combined stresses.										
References	• Structural Analysis by Russell C. Hibbeler, Pearson, 9th Edition, 2014, ISBN-13:978-0-13-394284-2. • Kenneth M. Leet, Chia-Ming Uang, Joel T. Lanning, Anne M. Gilbert. “Fundamentals of Structural Analysis”. McGraw-Hill Education, 2018. ISBN-13: 978-0073398006 • George, N. Frantziskonis. “Essentials of the Mechanics of Materials, Second Edition”. USA: Destech Publications, Inc. 2013. ISBN 13: 9781605950983 • Pytel, A. and Kiusalaas, J. “Mechanics of Materials Second Edition”. Cengage Learning2012. ISBN-13: 978-0-495-66775-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 122	Structure Analysis II	CIV 121	3	2	0	2	4	30	30	0	40
Course Contents	Buckling of Column, Elastic deflection of determinate structures (double Integration method and virtual work method). Influence line for determinate beam- Analysis of statically indeterminate structures (Three moment equations).										
References	• Aslam Kassimali , "Structural Analysis" Stamford USA: Cengage Learning, 4th Si Edition, 2011, ISBN-13: 978-0-495-29567-9 • Aslam Kassimali, "Structural Analysis", Stamford USA: Cengage Learning, 6th Si Edition, 2019, ISBN-13 : 978-1337630948 • Jack C. McCormac, "Structural Analysis Using Classical and Matrix Methods", John Wiley & Sons, Inc, 4th Edition, 2007, ISBN-13: 978-0470036082.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 123	Structure Analysis	BES 021	3	2	-	2	4	30	30	-	40
Course Contents	The course is an introduction to the basic tools of structural analysis and design. It contributes to the knowledge and skills required by the civil engineers in the following topics: Loads and reactions, stability of structures (external and internal), straining actions in statically determinate structures, normal stresses, shear stresses (pure shear, torsional), combined stresses, elastic deformations, and introduction to the analysis of statically indeterminate structures through 3-moment equation.										
References	• Structural Analysis by Russell C. Hibbeler, Pearson, 9th Edition, 2014, ISBN-13:978-0-13-394284-2. • Kenneth M. Leet, Chia-Ming Uang, Joel T. Lanning, Anne M. Gilbert. "Fundamentals of Structural Analysis". McGraw-Hill Education, 2018. ISBN-13: 978-0073398006										
Used in Program	Architecture Engineering Program							Semester	3		

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 142	Survey for Engineers I	BES 012	3	2	2	0	4	10	30	20	40
Course Contents	Basics of surveying and mapping (Definitions - Units - Scales- Reconnaissance - Sketch drawing)- Distance measurement (principles - optical measurements- EDM) - Angle and direction measurement (Vertical & Horizontal angle measurements) -Traverse (Traverse computation & adjustment) - Intersection and Resection - Area & volume computation - Vertical control & Leveling (Definitions - Methods of determining relative heights - Topographic maps - Precise leveling - Trigonometric leveling).										
References	• Elementary surveying. An introduction to geomatics by Ghilani C.D., Wolf P.R., PH 2011, ISBN 0132554348 • Engineering Surveying. W. Schofield& M. Breach, CRC Press, 2007, ISBN 9780750669498. • Surveying Problem Solving with Theory and Objective Type Questions *Dr* / A M Chandra - ISBN (13): 978-81-224-2532-1										
Laboratory	• Linear surveying measurements • Theodolite parts and calibration • Vertical and Horizontal angle measurements • Tacheometric surveying • Survey levelling instruments and height determination										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 143	Construction Survey	BES 012	3	2	2	0	4	10	30	20	40
Course Contents	To introduce the student to basic elements of surveying and their architectural applications. Plotting scales. Vertical and horizontal angle measurement, levelling & theodolites. Map drawing. Traverse computations and adjustment. Area and Volume calculations. Photogrammetry and its architectural applications. Remote sensing.										
References	• Engineering Surveying. W. Schofield& M. Breach - Sixth Edition 2007- ISBN–13: 978-0-7506-6949-8 • Surveying Problem Solving with Theory and Objective Type Questions Dr / A M Chandra- 2005- ISBN (13) : 978-81-224-2532-1										
Laboratory	• Linear surveying measurements • Theodolite parts and calibration • Vertical and Horizontal angle measurements • Survey levelling instruments and height determination										
Used in Program		Architecture Engineering Program						Semester			3

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 259	Design of RC Structures	CIV 123	2	2	0	1	3	30	30	0	40
Course Contents	The course presents the fundamentals of reinforced concrete structures such as reinforcement details of beams, solid slabs, columns, and stairs. It focuses on loads and load distribution. The course contributes to the knowledge and skills in the following topics: Statically determinate frames, ribbed and hollow block slabs, paneled beam slabs, flats slabs, and openings in slabs.										
References	• Egyptian Code of Practice – ECP 201-2018 • Structural design for architecture – Angus j macdonald, ISBN 0 7506 3090 6										
Used in Program	Architecture Engineering Program							Semester	4		

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 161	Fluid Mechanics	BES 031	2	2	1	0	3	10	30	20	40
Course Contents	Dimensions and Units - Fluid Properties - Fluid Statics (Pressure distribution - Pressure measurements - Forces on submerged surfaces) - Buoyancy and Floatation - Fluids in Relative Equilibrium - Fluid Kinematics (Description of Fluids motion - Continuity Equation - Velocity and Acceleration) - Fluid Dynamics (Energy Equation - Applications of Bernoulli's Equation) - Impulse-Momentum Equation - Application of the Momentum Equation - Flow in Pipes – Pipes Systems.										
References	• A Brief Introduction to Fluid Mechanics, sixth Edition by Donald F. Young, Bruce R. Munson, Theodore H. Okiishi, Wade W. Huebsch, Wiley 2010, ISBN: 0470596791, 9780470596791 • E. Shashi Menon, "Liquid Pipeline Hydraulics", Marcel Dekker, 2004.										
Laboratory	• Determine Densities, Specific Gravities, Weights and Viscosity. • Bernoulli's Theorem Demonstration. • Flow through sharp edged Orifice. • Flow over Rectangular and Triangular Weirs. • Friction in a smooth bore pipe, Minor loss Experiment.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 162	Hydraulics	CIV 161	2	2	1	0	3	10	30	20	40
Course Contents	Basic Principles (open channel flow) - Uniform Flow (Basic equations for steady uniform flow - Velocity and shear stress distributions in open channels) – Non-Uniform Flow (Specific energy - Hydraulics of channel bed transition) - Hydraulic Jumps - Gradually Varied Flow - Open Channel Design (Rigid boundary and erodible channel) - Dimensional analysis and Similarity (Methods of dimensional analysis - Model analysis and similarity) – Hydraulics Machinery (Pumps and Turbines) – Unsteady Flow.										
References	• Fundamentals of Hydraulic Engineering, by Prasuhn, Alan L., Oxford University Press 1992, ISBN 978-1-61344-141-1, 978-0-19-510732-6 • Strum, W. T., (2001). Open Channels Hydraulics, McGraw-Hill Higher Education, USA. • Chow, V.T (ed.): "Handbook of Hydrology," McGraw-Hill, New York, 1964. • Novak, P., Moffat, A. I. B., Nalluri, C., Narayanan, R. (2001) Hydraulic Structures, Third Ed, Spon, London										
Laboratory	• Open Channel Flow • Hydraulic Jump • Pump Characteristics										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 200	Civil Engineering Application I	Completion of 70 CR	3	2	2	0	4	10	30	20	40
Course Contents	The main elements of structures - Construction techniques - Types of Formworks (wooden forms -metallic forms - tunnel formwork - climbing formwork - slip formwork - lift slabs system) - Formwork design, implementation and receiving - Steel reinforcement works and receiving - bricks works.										
References	• Construction Technology Paperback English by Mr Roy Chudley, Roger Greeno ISBN-13 9780131286429 • Fundamentals of Building Construction : Materials and Methods, By Edward Allen, Joseph Iano, ISBN13 9781119446194										
Laboratory	• Construction techniques • Wooden formwork • Metallic formwork • Bricks works										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 202	Civil Engineering Application II	Completion of 70 CR	3	2	2	0	4	10	30	20	40
Course Contents	Thermal insulation - Water proofing - Water supply and sanitary works - Flooring - Doors and windows - Internal and External Finishes (Plastering and Painting). Construction of Steel Structures (Cutting - Drilling- Shaping - Welding - Bolts - Erection – Cladding).										
References	• Construction Technology Paperback English by Mr Roy Chudley, Roger Greeno, ISBN-13 9780131286429 • Structural steel fabrication and erection by s.k.saxena, r.b.asthana, isbn-13 : 978-8170392071										
Laboratory	• Thermal insulation works, Water proofing works, Water supply and sanitary works, Flooring works, Wood works, Painting works, Steel welding works										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 221	Structure Analysis III	CIV 122	3	2	0	2	4	30	30	0	40
Course Contents	Analysis of statically indeterminate structures:1-Force approach (Consistent deformation method), 2- Displacement approach (Slope deflection Method, Moment distribution method). Introduction to Matrix Structural Analysis for 1-D element using Stiffness method (Truss, Beam, and frame elements).										
References	Aslam Kassimali, “Structural Analysis”, Cengage Learning, Fifth Edition, 2015. ISBN-13: 978-1133943891										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 222	Design of Metallic Structures I	CIV 122	3	2	0	2	4	30	30	0	40
Course Contents	Steel as a construction material - Material properties and steel sections - Allowable Stress Design method - Design of tension members - Design of compression members - Columns in braced and unbraced frames - Design of flexural members - Types and classification of beam cross sections - Design of laterally supported and unsupported beams - Design of beam-columns (axial and flexural forces) - Design of bolted connections - Design of welded connections.										
References	• Egyptian code for design of steel structure. • Steel structures design by Prof Dr. Abdulrahim Khalil Dessouki. • Advanced Steel Design Of Structures, by Prof. Srinivasan Chandrasekaran, Indian Institute of Technology, India. ISBN-13 9780367232900 • Steel Designers' Manual, By (Steel Construction Institute), Edited by Buick Davison and Graham W. Owens, ISBN-13 9781119249863										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 231	Soil Mechanics	CIV 111	3	2	2	0	4	10	30	20	40
Course Contents	Introduction to Geotechnical Engineering - Definitions and Relationships - Index Properties of Soil - Soil Classification Systems (Unified – British) - Permeability and Seepage of Soil (Darcy's Law - Capillarity in Soils - Flow Net Analysis) - Stress Distribution in Soil (Point load – Uniform Load (Newmark – Fadum - Approximation)) - Shear Strength of Soil (Direct Shear Box - Triaxial– Unconfined Compression) - Lateral Earth Pressure (Active and Passive) - Soil Compaction (Standard Proctor - Modified Proctor).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • Das, B. M, Soil Mechanics Laboratory Manual, Oxford University Press, 9th. Ed., ISBN 978 – 019 – 020 – 966 – 7, 2016.										
Laboratory	• Specific Gravity Determination. • Atterberg Limits (Liquid Limit – Plastic Limit – Shrinkage Limit). • Grain Size Distribution - Coarse Grained Soils. (Sieve Analysis). • Grain Size Distribution - Fine Grained Soils (Hydrometer Analysis). • Determination of Natural Unit Weight of Soil (Sand Bottle Test - Core Cutter Test). • Constant Head Permeability TeSA • Falling Head Permeability TeSA • Direct Shear Box TeSA • Tri-axial Shear TeSA • Unconfined Shear TeSA • Standard Proctor TeSA • Modified Proctor TeSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 232	Geotechnical Engineering and Foundations	CIV 231 CIV 251	3	2	2	0	4	10	30	20	40
Course Contents	Soil Consolidation and Settlement (Soil Consolidation Theory - Primary and Secondary Settlement - Oedometer Test) - Bearing Capacity of Soil (Terzaghi Eq. - Mayerhof Eq. – Egyptian Code Eq.) - Shallow Foundations (Construction Considerations - Design Considerations) - Design of Isolated Footings (Square and Rectangular Footings – Footing with Moment) - Design of Strip Footings - Design of Combined Footings - Design of Strap Beam Footings - Design of Rafts (Conventional Method – Ribbed Raft).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Engineering of Surface Foundations, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (19440/2015), ISBN 978 – 977 – 726 – 139 – 5, 2015. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Das, B. M, Soil Mechanics Laboratory Manual, Oxford University Press, 9th. Ed., ISBN 978 – 019 – 020 – 966 – 7, 2016.										
Laboratory	• One Dimensional Consolidation Test (Oedometer Test). • SPT: Standard Penetration TeSA • CPT: Cone Penetration TeSA • Plate Loading TeSA										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 241	Survey for Engineers II	CIV 142	3	2	2	0	4	10	30	20	40
Course Contents	Basics of geodesy- Geodetic datum – Reference Ellipsoid- Geoid determination –Terrestrial Coordinate systems and associated transformations – Geodetic position computations on the reference Ellipsoid (2 D approach for horizontal control)- Geodetic position computations in Space (3 D approach) – direct Geodetic problem – Inverse Geodetic problem – (GNSS) Global Navigation Satellite System - Satellite orbits - Satellite signals – Observables - Mathematical models for positioning - Data processing - Data transformation.										
References	• Elementary surveying. An introduction to geomatics by Ghilani C.D., Wolf P.R., PH 2011, ISBN 0132554348 • Engineering Surveying. W. Schofield& M. Breach, CRC Press, 2007, ISBN 9780750669498. • Surveying Problem Solving with Theory and Objective Type Questions Dr / A M Chandra - ISBN (13): 978-81-224-2532-1										
Laboratory	• Total station parts • Total Station software • Coordinates by Total Station • Lay out and setting out by Total Station										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 251	Design of R.C. Structures I	CIV 114 CIV 122	3	2	0	2	4	30	30	0	40
Course Contents	Properties of concrete materials - Ultimate limit states design method - Design of sections under pure bending moment (Rectangular, L & T - sections) - Load distribution – Design of section under shear – Design simple and continuous beams - Design of one-way and two-ways solid slabs - Design of hollow block slabs - Design of panelled beams.										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018 • Design of Concrete Structures, Arthur H Nilson, D.Darwin, Charles W. Fifteenth Edition,2016. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume I, second edition, 2012. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 2, Third edition, 2012. • Fundamentals of Reinforcement Concrete and Prestressed concrete, M.Hilal, 1987.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 252	Design of R.C. Structures II	CIV 251	3	2	0	2	4	30	30	0	40
Course Contents	Design of flat slabs - Design of sections subjected to bending moment and axial force - Analysis and design of columns – Design of RC frames -Design of Sections under Torsion- Serviceability limit states (deflection - crack width).										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018 • Design of Concrete Structures, Arthur H Nilson, D.Darwin, Charles W. Fifteenth Edition,2016. • Fundamentals of Reinforcement Concrete and Prestressed concrete, M.Hilal, 1987. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 2, Third edition, 2012. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 3, First edition, 2011.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 261	Hydrology	CIV 162	2	2	0	1	3	30	30	0	40
Course Contents	Introduction to water balance and hydrological cycle – Precipitation – Evaporation – Transpiration – Infiltration – Runoff – Hydrograph – Hydrology of the Nile basin – Flood routing – Storage and reservoir operation – Groundwater hydrology (Aquifers and groundwater reservoirs – confined and unconfined flow – design of wells – Groundwater management) – Application of computer programs in hydrology such as HEC-RAS.										
References	• Mays, L.W., Ground and surface water hydrology. John Wiley & Sons, Inc., 2012. ISBN: 978-0-470-16987-2 • Subramanya, K., Engineering Hydrology. 4th Edition 2017.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 272	Water Supply Engineering	CIV 162	3	2	2	0	4	10	30	20	40
Course Contents	Introduction, Preliminary studies for water supply projects, sources of water, water quality and standards, design flow rates, water collection, Design of water treatment plants using conventional processes (Sedimentation - Coagulation and Flocculation - Filtration - Disinfection), water pumping and transportation works, water storage, water distribution networks.										
References	• Water and Wastewater Technology: Pearson New International Edition, ISBN-13: 9781292021041 • Water supply, prof. Dr. M. Basiouny • Lectures presentations • شبكات المياه - الكود المصرى • محطات تنقية مياه الشرب - الكود المصرى										
Laboratory	Determine Turbidity, PH, Temperature, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Volatile Solids (VS), Chloride, Iron and Manganese, Arsenic, Fluorides and total bacteria account										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 282	Traffic and Transportation Engineering	BES 112 BES 211	3	2	2	0	4	10	30	20	40
Course Contents	Transportation Planning: Introduction to transportation planning - Study area - Transportation planning surveys - Travel demand forecasting (Trip generation - Trip distribution - Modal split (Mode Choice) - Traffic assignment) - Transportation evaluation Traffic Engineering: Introduction (Road user characteristics - Vehicle characteristics) - Traffic volume - Traffic speed - Traffic density - Travel time and delay studies - Traffic Flow characteristics - Parking studies - Traffic control devices - Intersection control - Traffic signals design.										
References	• Traffic and Highway Engineering, Nicholas Garber and Lester Hoel, Fifth Enhanced SI Edition, CENGAG Learning, 2020, ISBN-13: 978-1-337-63104-4. • الكود المصرى للطرق – 2020 .										
Laboratory	• Traffic surveys (traffic volume count) • Speed & delay study • Parking study • Roadside and household interviews.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 300	Contracts and Legalizations	CIV 222 CIV 252	2	2	0	1	3	30	30	0	40
Course Contents	Define contract documents, define priority of contract documents, regulations, construction law Plan and manage construction documents, deal with biddings and financial issues including project insurances, disputes. Acquire knowledge and understanding the ability to prepare and analyze the bill of quantities for any specified project. The preparation and calculation of the on-going works quantities. The ability to manage construction project.										
References	• law no 89 issue year 1998, civil law • law no 82/2018, civil law • Fidic contracts forms 2017 red book edition, ISBN: 978-2-88432-084-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 302	Computer Applications in Civil Engineering	CIV 122 ELE 042	2	1	3	0	4	10	30	20	40
Course Contents	Introduction to analyzing structures using the computer - Choosing appropriate models for analyzing different structures - Applications to internal forces and deformations in space structures (Beams, Frames, and Trusses) - Applications to represent supports in the frames including the interaction between the structures and the soil - Structural deformations - Thermal effect on structures - Computer Applications for Design of Reinforced Concrete Structures (Design of columns and beams) - Data Base Forming - Curves and Charts Drawing - Optimization.										
References	Computer Application in Civil Engineering, dsmbooks, Liverpool, United Kingdom, ISBN 13: 9789382174202.										
Laboratory	• Modelling of space structures (Beams, Frames, and Trusses). • Modelling of supports in the structures including the interaction between the structures and the soil. • Thermal effect on structures. • Applications for Design of Reinforced Concrete Structures (Design of columns and beams). • Data Base Forming, Optimization										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 304	Quality Control and fundamentals of Repair and Strengthening of Structures	CIV 252 CIV 321	2	2	0	1	3	30	30	0	40
Course Contents	Definition of quality control and assurance - Quality control requirements – Quality control of concrete materials – Quality control before concreting - Quality control during concreting - Quality control after concreting – Assessment of hardened concrete results – Quality control levels – Statistical quality control – Assessment of reinforced concrete structures - Defects of Reinforced concrete structures – Fundamentals of strengthening and repair of reinforced concrete structures – Assessment of steel structures - Defects of steel structures – Fundamentals of strengthening and repair of steel structures.										
References	• 203 - الكود المصري لتصميم وتنفيذ المنشآت الخرسانية. • El-Kasaby, E. A., Repair of concrete structures, Dar Al-Kutub Al-Almia, Cairo, 2nd Ed., (19441/2015), ISBN 978-977-726-140-1, 2016. • Quality Management in Construction Projects by Abdul Razzak Rumane, ISBN-13: 978-0367890032, ISBN-10: 0367890038. • Concrete Structures: Protection, Repair and Rehabilitation by R. Dodge Woodson, ISBN-13: 978-1856175494, ISBN-10: 1856175499. • Egyptian codes for design of steel structure. • Steel Designers' Manual, By (Steel Construction Institute), Edited by Buick Davison and Graham W. Owens, ISBN-13 9781119249863 • Strengthening of Steel Structures: Performance of Steel Beams Bonded with FRP by LAP LAMBERT Academic Publishing, ISBN-10 : 9783844384192 ISBN-13 : 978-3844384192										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 306	Engineering Economy	-	2	2	0	1	3	30	30	0	40
Course Contents	Foundations of Engineering Economy, Interest Factors, Nominal and Effective Interest Rates, Present Worth Analysis, Annual Worth Analysis, Rate of Return Analysis, Benefit/Cost Analysis, Breakeven and Payback Analysis, Replacement and Retention Decisions, Effects of Inflation, Estimating Costs, Depreciation Methods, After-Tax Economic Analysis, Multiple Attributes and Risk.										
References	• Basics of Engineering Economy, Leland Blank & Anthony Tarquim, McGraw HILL, Third Edition, 2020, ISBN-13 : 978-1260571141 • Engineering Economy, William G. Sullivan, Elin M. Wicks, & C. Patrick Koelling, Seventeenth Global Edition, Pearson, 2020, ISBN 13: 978-1-292-26490-5. • Engineering Economy, Leland Blank & Anthony Tarquim, McGraw HILL, Eighth Edition, 2018, ISBN: 978-0-07-352343-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 312	Modern Construction Materials	CIV 114	3	2	0	2	4	30	30	0	40
Course Contents	Different types of new construction materials (for examples, fiber reinforced polymer & Geopolymer concrete) – Constituents of new construction materials - Properties of the new construction materials (Physical, Chemical & Mechanical properties) - Fabrication technology - Comparison with conventional construction materials - Structural applications - Testing - Economical point of view.										
References	• الكود المصري لأسس تصميم وإشتراطات تنفيذ استخدام البوليمرات المسلحة بالألياف في مجالات التشييد – 205. • Construction Materials, their Nature and Behavior, Marios Soutsos, Edited by Peter Domone and John Illston, ISBN-13: 978-1498741101 / ISBN-10: 9781498741101. • Fundamentals of Materials Science and Engineering, William D. Callister Jr., David G. Rethwisch, Wiley Abridged Print Companion, ISBN-13: 978-1119498926, ISBN-10: 1119498929.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 321	Design of Metallic Structures II	CIV 222	3	2	0	2	4	30	30	0	40
Course Contents	Classical bridge types - Different bridge systems - loads (Roadway - Railway - Other loads) - Design of floor beams systems - plate girder bridges (Preliminary proportioning - Design for bending - Design for shear - Combined shear and moment - Buckling of plates - Longitudinal and transversal stiffeners - Load bearing stiffeners - Splices - Curtailment of flange plates - Details) - Wind bracing systems - bridge bearings.										
References	• Egyptian code for design of steel structure. • Steel bridges by Prof. Metwally Abu-Hamd, Cairo University • Planning and Design of Bridges, by Prof. M.S. Troitsky, ISBN-13 9780471028536										

.	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 322	Structure Analysis IV	CIV 221	3	2	0	2	4	30	30	0	40
Course Contents	Dynamic equilibrium; Dynamic equations of motion for single-degree-of-freedom systems; Analysis of free and forced vibration. Damping in structures. Numerical evaluation of dynamic response. Dynamic equations of motion for two and multi degrees of freedom structures; Natural vibration properties of structures and Mode Shapes. Modal superposition method; Introduction to response history analysis; Response spectrum for elastic structures. Seismological Background (Earthquakes, causes, effects, and scales) - Egyptian Code applications (Earthquake analysis using equivalent static method- Response spectrum analysis).										
References	• Aggarwal P., Shrikhande, M., "Earthquake Resistant Design of Structures", Prentice Hall India Learning, Private Limited; 1 edition, 2006, ISBN-13: 978-8120328921. • Anil K. Chopra, " DYNAMICS OF STRUCTURES", Prentice Hall, United States of America; 4th edition, 2012, ISBN-13: 978-0132858038. • Ray W. Clough, Joseph Penzien " DYNAMICS OF STRUCTURES", Computers & Structures, Inc, United States of America; 3rd edition, 2003.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 229	Design of Steel Structures	CIV 123	2	2	0	1	3	30	30	0	40
Course Contents	The course presents the fundamentals of steel structures and materials through the following topics: such as material properties and steel sections, allowable Stress Design method - Concept of tension members, compression members, and flexural members, the different Types and classification of beam cross sections, Concept of beam-columns (axial and flexural forces), bolted and welded connections.										
References	• Egyptian code for design of steel structure. • Advanced Steel Design Of Structures, by Prof. Srinivasan Chandrasekaran, Indian Institute of Technology, India. ISBN-13 9780367232900 • Steel Designers' Manual, By (Steel Construction Institute), Edited by Buick Davison and Graham W. Owens, ISBN-13 9781119249863										
Used in Program		Architecture Engineering Program			Semester			7			

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 324	Metallic Structures Design III	CIV 222	3	2	0	2	4	30	30	0	40
Course Contents	Composite construction - composite floor beams (Strength requirement - shear connectors - formed metal deck) - Design of composite columns - Flexural design of slender sections - Connection classification and design (Flexible - Rigid – Semi rigid) - Design of base plates and anchor bolts – Introduction of Load and Resistance Factor Design (LRFD) - Identification of Limit states (Strength limit state and Serviceability limit state) - Design of tension, compression and flexure members using LRFD approach.										
References	• Egyptian Code of Practice for Steel Construction and Bridges (LRFD). • Steel structures design by Prof Dr. Abdulrahim Khalil Dessouki. • Steel Design for Engineers and Architects, by David A. Fanella, Rene Amon, Bruce Knobloch, Atanu Mazumder, United States of America ISBN-13: 978-1-4615-9731-5										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 331	Design of Foundations and Earth Retaining Structures	CIV 232	3	2	0	1	3	30	30	0	40
Course Contents	Pile Foundations (Types of Piles - Load Transfer Mechanisms - Static Capacity for Piles - Field Load Tests – Pile Group – Elastic Centre Method - Design of Pile Caps) - Introduction to Earth Retaining Structures - Pile wall (Secant piles - Tangent Piles - Bored Pile Wall) - Construction Techniques and Design of Retaining Walls (Cantilever RW – Counterfort RW) – Introduction to Reinforced Soil RW - SPW.										
References	• El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 332	Special Topics in Geotechnical Engineering	CIV 331	3	2	0	2	4	30	30	0	40
Course Contents	Soil Exploration and Site Investigation (Field Exploration - Geological Surveys - Borings and Soil Boring Reports) - Stability of Slopes (Slope Failures Causes - Wedge - Friction Circle - Slices Method) - Difficult Soils (Collapsible - Soft Soil – Swelling - Fill) - Soil Stabilization and Improvement Techniques – Soil Grouting - Ground Water and its Control (Design Consideration – Surface Dewatering – Well Point System - Shallow and Deep Wells – Freezing Process - Soil Filter – Construction Precautions)										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 334	Special Topics in Foundations Engineering	CIV 331	3	2	0	2	4	30	30	0	40
Course Contents	Piers and Caissons (Construction and Design Considerations) – Wall Supports (Shafts - Mechanical Stabilization Wall - Crib - Barrette - Gabions) - SPW (Cantilever – Anchored (Free - Fixed – Grouted)) - Braced Excavations (Design Consideration – Berline Wall) - Reinforced Soil RW by Geotextiles - Soil Nailing and Anchoring - Cofferdams - Ground Oil Steel Tanks - Foundations on Difficult Soil - Foundations for Offshore Structures – Introduction in Tunnel Engineering - Dams (Earth Dams – Seepage - Dams Failures).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bernhard Maidl; Markus Thewes; Ulrich Maidl, Handbook of Tunnel Engineering, Volumes I and II, ISBN 978 – 343 – 303 – 078 – 3, 2014. • Robin Fell; Patrick MacGregor; David Stapledon; Graeme Bell; Mark Foster, Geotechnical Engineering of Dams, CRC Press, 2nd Ed., ISBN 978 - 113 – 800 – 008 – 7, 2018. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 342	Satellite Geodesy	CIV 241	3	2	0	2	4	30	30	0	40
Course Contents	Geodetic positioning using Artificial Satellites – positioning by satellites – satellite orbital space geometry – satellite coordinates and associated transformations – satellite Cartesian coordinates in the average terrestrial system – Satellite observing techniques - Basic Observation Concepts and Satellites Used in Geodesy - Doppler Techniques - Satellite Altimetry – Applications of Satellite altimetry.- Digital Elevation Models and Digital Terrain Models - Data Sources for Digital Terrain Modeling.										
References	• Seeber · Satellite Geodesy -2nd completely revised and extended edition - Walter de Gruyter ·Berlin New York 2003 - ISBN 3-11-017549-5 • Bock, Y., Leppard, N. (eds.) (1990): Global Positioning System. An Overview. Symposium No. 102, Edinburgh, August 7-8, 1989. International Association of Geodesy. Symposia, Springer-Verlag, New York - ISBN 978-1-4615-7111-7 • Zhilin Li, Qing Zhu, Christopher Gold (2004) DIGITAL TERRAIN MODELING Principles and Methodology -ISBN 0-415-32462-9										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 344	Underground Utility Survey	CIV 241	3	2	0	2	4	30	30	0	40
Course Contents	Basics of Surveying the Underground - Transferring Traversing and Levelling Measurements Transferring surface coordinates to underground workings Understanding limitations of transfer techniques - Traditional Methods to Map Utilities -Common Utility Types - Basic introduction to utility detection theory and methods –Electromagnetic pipe and cable locators Basic Ground Penetrating Radar (GPR) - Principles- Electro Magnetic VS GPR Comparison.										
References	• Walker J, Awange JL (2018) Surveying for Civil and Mine Engineers. Springer Nature. • Awange J, Paláncz B Geospatial Algebraic Computations. 3rd edition. Springer-Verlag GmbH- ISBN 978-3-030-45803-4 • Costello, Brad, UNDERGROUND CHECK SURVEY, ENG4111/4112 – Undergraduate dissertation, University of Southern Queensland, 2016. (https://eprints.usq.edu.au/31389/1/Costello_B_Gharineiat.pdf) • Erica Carrick utsi (2017) Ground Penetrating Radar Theory and practice – Elsevier - Paperback ISBN: 9780081022160										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 346	Hydrographic Survey	CIV 241	3	2	0	2	4	30	30	0	40
Course Contents	Hydrographic standards and classifications - Vertical depth measurements - Horizontal position fixing - Effects of vessel roll pitch and heave - The WGS84 datum - GNSS Terminology - Differential GNSS Reference Stations (DGPS & ERS) - Specifying hydrographic surveys - ERS Datum Transformation Requirements - Tides and Water Levels Requirements - Depth Sounding - Multibeam and Other Echosounders -Corrections to Echo Soundings and Uncertainty Assessment - Acoustic Backscatter.										
References	• HYDROGRAPHIC SURVEYS SPECIFICATIONS AND DELIVERABLES, April 2017 - National Oceanic and Atmospheric Administration • US Army Corps of Engineers. 1994. Hydrographic Surveying: Engineering and Design, Washington DC, US Army Corps of Engineers- ISBN 1110-2-1003										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 351	Design of R.C. Structures III	CIV 252	3	2	0	1	3	30	30	0	40
Course Contents	Halls - Arched systems (slab - girder) - Prestressed concrete (beams) - Design of water structures (Circular tank - Rectangular tanks - Underground tanks - Elevated tanks - Wide tanks) - Design of shell structures (domes - cones)- Design of deep beams.										
References	Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018. Arthur H Nilson, D.Darwin, Charles W. Design of Concrete Structures, Fifteenth Edition,2016. Mohammed Hilal, 1987, Design of Reinforced Concrete Halls – Part 1 & 2. Mashhour Ghoneim, Mahmoud Elmihilmy, Design of reinforced concrete structures, Volume 3, First edition, 2011. Mohammed Hilal, 1987, Theory And Design of Reinforced Concrete Tanks part 1 & 2.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 352	R.C. Structures Design IV	CIV 351	3	2	0	2	4	30	30	0	40
Course Contents	Pre-stressed concrete (slabs) – Types of joints (construction – shrinkage – expansion)- Design of short cantilever- Design of high-rise buildings (Loads – Resisting systems – Design of structural elements – Reinforcement details) – Types of R.C. bridges – Design of R.C. bridges (Slab type – Girder type – Box-girder type).										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018. • Design of Prestressed Concrete, Arthur H Nilson, 2nd Edition, 1991. • Fundamentals of Reinforcement Concrete and Prestressed concrete, M.Hilal, 1987. • Design of reinforced concrete structures, Mashhour Ghoneim, Mahmoud Elmihilmy, Volume 3, First edition, 2011.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 361	Irrigation and Drainage Engineering	CIV 161	2	2	0	1	3	30	30	0	40
Course Contents	Introduction, the Nile River, water consumptions, Irrigation methods, planning of irrigation networks, Basis and procedures for designing canal sections. Sprinkler irrigation, drip irrigation, Sources of drainage water, importance of land drainage, clarification of drainage systems. Surface and subsurface drainage, Design of horizontal and vertical drainage systems, drainage system performance, reuse of drainage water. Planning of irrigation projects.										
References	• Waller P, Yitayew M, Irrigation and Drainage Engineering, Springer 2016. ISBN: 978-3-319-34631-1 • Shun Lin, C. Lee. Water and Wastewater Calculations Manual, McGraw-Hill Professional, Second Edition, 2007, ISBN-13: 978-0071476249										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 362	Design of Irrigation Structures	CIV 162	3	2	0	2	4	30	30	0	40
Course Contents	Introduction, irrigation and drainage network, irrigation structures and their functions, general requirements and design considerations (hydraulic design, loads, stability, Cracking limits, structural design), crossing structures (Culverts, Syphons, Aqueducts, Short span Bridges, weir, regulators), Tail escapes, Construction methods.										
References	• Novak, P., Moffat, A. I. B., Nalluri, C. & Narayanan, R. Hydraulic Structures, Fourth Edn, Spon, London, 2007, ISBN 9780415386265 • S. K. Sharma. design of irrigation structures, RSM Press, ISBN: 8121903297, 9788121903295										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 364	Coastal Engineering	CIV 162	3	2	0	2	4	30	30	0	40
Course Contents	Waves and current movements- stability of shoreline- erosion and sedimentation in unstable shoreline- shore protection structures- modifying the wave property - Revetments of shoreline- theoretical and empirical equations representing sediments movements in marine structure zones- sand nourishment. Coastal water level fluctuations. Mechanics of wave motion. Beach profiles. Surf dynamics and sediment transport. Design wave characteristics. Wave forces on cylinders. Morison equation. Wave forces on vertical walls. Effects of approach angle and non- verticality, Breakwater design.										
References	Basic coastal engineering, by Sorensen R.M., Springer (2006), ISBN: 0387233326, 9780387233321										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 371	Sanitary Engineering	CIV 272	3	2	2	0	4	10	30	20	40
Course Contents	Introduction, sources, types and characteristics of municipal wastewater, Municipal wastewater collection and transportation, Preliminary treatment of municipal Wastewater: deceleration chamber, screen and grit chamber, Primary treatment of municipal wastewater, Secondary treatment of municipal wastewater: activated sludge process, trickling filter process, rotating biological contactor, aerated lagoon and oxidation pond, Sludge treatment & disposal: thickening, stabilization and dewatering.										
References	• Metcalf & Eddy l AECOM (2014) Wastewater Engineering, Treatment and Resource Recovery, ISBN 978-0-07-340118-8 • Sewerage Prof. Dr. M. Basiouny • Lectures presentations • محطات الرفع - الصرف الصحى- الكود المصرى- • أعمال المعالجة- الصرف الصحى - الكود المصرى-										
Laboratory	• Determine PH, Temperature, Total Solids (TS), Chloride, Nitrogen, Phosphorus, • Heavy Metals, Biochemical Oxygen Demand (BOD), Chemical Oxygen • Demand (COD), Dissolved Oxygen (DO), total bacteria account and Total coliform.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 372	Advanced Sanitary Engineering	CIV 371	3	2	0	2	4	30	30	0	40
Course Contents	Nitrogen removal and recovery – Phosphorous Removal and recovery - Membrane filtration - Adsorption - Ion exchange - Reverse osmosis - Air and flotation - Wastewater reuse.										
References	Metcalf & Eddy l AECOM (2014) Wastewater Engineering, Treatment and Resource Recovery, ISBN 978-0-07-340118-8										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 381	Highway Engineering I	CIV 142 CIV 231 CIV 282	3	2	2	0	4	10	30	20	40
Course Contents	Geometric design: Functional Classification of Roads & Cross Section Elements, sight distance, Vertical Alignment, Horizontal Alignment. Structural design: Pavement types and components - Subgrade soil classification - Subgrade soil strength- Soil compaction - Soil stabilization - Stresses in flexible pavement - Flexible pavement design - Testing and specifications of road aggregates - Testing and specifications of bituminous materials - Hot mix asphalt concrete characteristics and design.										
References	• Traffic and Highway Engineering, Nicholas Garber and Lester Hoel, Fifth Enhanced SI Edition, CENGAG Learning, 2020, ISBN-13: 978-1-337-63104-4. • AASHTO, A Policy on Geometric Design of Highways and Streets “Green Book”, 7th Edition, 2018, ISBN-13: 978-1560516767. • Pavement Analysis and Design, Yang Huang, Second International Edition, Pearson, 2012, ISBN-13: 978-0-13-272610-8. • Hot Mix Asphalt Materials, Mixture Design and Construction, E. Ray and Prithvi S. Kandhal and Freddy L. Roberts and Y. Richard Kim and Dah-Yinn Lee and Thomas W. Kennedy Brown , Third Edition, National Asphalt Pavement Association Research and Education Foundation, 2009, ISBN-13 : 978-0914313021 • الكود المصرى للطرق – 2020.										
Laboratory	• CBR Test, and Plate Loading Test • Tests of bituminous materials • Hot mix asphalt concrete design (Marshall Method)										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 382	Airport Engineering	CIV 381	3	2	0	2	4	30	30	0	40
Course Contents	Airport planning - Aircraft characteristics related to airport design - Airport configuration - Airport airside capacity and delay - Geometric design of the airfield – Planning and design of the terminal area - Structural design of airport pavements - Airport lighting, marking, and signing - Airport drainage.										
References	• Airport Design and Operation, ANTONI´N KAZDA & ROBERT E. CAVES, Emerald Group Publishing Limited, Third Edition, 2015, ISBN: 978-1-78441-870-0. • Planning and Design of Airports, Robert Horonjeff, Francis X. McKelvey, William J. Sproule, and Seth B. Young, Fifth Edition, Mc Graw Hill, 2010, ISBN-13: 978-0071446419. • Airport Engineering Planning and Design, Subhash C. Saxena, CBS Publishers & Distribution, India, First Edition, 2008, ISBN: 978-81-239-1550-0										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 384	Railway Engineering	CIV 282	3	2	0	2	4	30	30	0	40
Course Contents	Introduction to Railways Engineering, Urban and Sub-urban design of railways, Vertical and horizontal curves- rails design- wood and concrete sleepers design - stresses in gravels section - railways intersections - signs and design of control stations; Economical and environmental effect of railways.										
References	• Practical railway engineering, by Clifford F. Bonnett, Imperial College Press; Distributed by World Scientific Pub 2005, ISBN: 1860945155, 9781860945151 • Railway Engineering, by Satish Chandra, M.M. Agarwal, 2nd edition 2013, ISBN-10: 019808353X.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 398	Senior Design Project I	*	2	0	4	0	4	50	0	50	--
Course Contents	Topics are selected by groups of students according to their area of interest upon advisor approval. Projects address solutions to open-ended applications using an integrated engineering approach.										
References	According to the selected project										
Laboratory	According to the selected project										

* The student can register the senior design project course after passing 70% of the program cr. hrs, i.e., 112 Cr. Hr. + completion of the prerequisite courses of the project.

Code	Course Name	Pre-req.	Credit Hours	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 401	Construction Engineering & Management	CIV 300 *	2	2	0	1	3	30	30	0	40
Course Contents	Plan and manage construction processes, address construction defects, maintain safety issues for construction and materials deal with biddings and financial issues including project insurances. Acquire knowledge and understanding of project management and assess the economical environmental impact of construction projects. The ability to prepare the bill of quantities for any specified project. The preparation and calculation of the on-going works quantities. The ability to manage construction project.										
References	• A Guide to the Project Management Body of Knowledge (PMBOK® Guide), by Project Management Institute, Sixth Edition, 2017, ISBN-13: 978-1628251845. • Construction process planning and management, Sidney M. Levy, Elsevier publisher, 2010, ISBN: 978-1-85617-548-7.										
Used in Program	Civil & Architecture Engineering Program							Semester	9		

* Prerequisite for Civil Engineering Program Only

Code	Course Name	Pre-req.	Credit Hours	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 403	Construction project specifications, bids, and contracts	CIV 300	3	2	0	2	4	30	30	0	40
Course Contents	Participants in a construction contract. Contract definition. Types of contracts; formation principles of a contract, performance or breach of contractual obligations. Analysis and comparison of the different kinds of construction contracts. Bidding logistics. Legal organizational structures. Different types and uses of specifications. Different forms of contracts utilized in construction.										
References	Construction process planning and management, Sidney M. Levy, Elsevier publisher, 2010, ISBN: 978-1-85617-548-7.										

Code	Course Name	Pre-req.	Credit Hours	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 405	Value Engineering in the Construction Industry	CIV 300	3	2	0	2	4	30	30	0	40
Course Contents	The value concept: history, definitions, application to the construction industry, incentive provisions in construction contracts, factors to be considered, application to design. Value engineering methodology: information phase, speculative phase, analytical phase, proposal phase, and final report phase. Value engineering study procedures: objective, selecting the input required, required documentation, life cycle cost methodology.										
References	• Value Engineering Practical Applications for Design, Construction, Maintenance & Operations, Alphonse Dell ISOLA, RSMeans, 1997, ISBN: 0-87629-463-8. • Value Engineering Manual, By West Virginia Department of Transportation Division of Highways Engineering Division, Printed By: Wvdoh Office Services Division, January 1, 2004.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 407	Repair and Strengthening of Concrete Structures	CIV 304	3	2	0	2	4	30	30	0	40
Course Contents	Restoration style design - Specifications and selection of restoration materials (Concrete, cemented materials, Epoxy, FRP and others) - Concrete roof repair - Crack repair - Restoration and strengthening concrete elements (Columns, Beams, Slabs, Connections, Concrete walls, and Foundations)- Restoration and strengthening of reinforced concrete structures using fiber-reinforced polymers (FRP)-Applications and field examples.										
References	El-Kasaby, E. A., Repair of concrete structures, Dar Al-Kutub Al-Almia, Cairo, 2nd Ed., (19441/2015), ISBN 978-977-726-140-1, 2016.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 421	Modelling of Structures	CIV 322	3	2	2	0	4	30	30	0	40
Course Contents	General derivation of finite element equilibrium equations - General coordinate models for specific problem (one dimensional element - Plane stress/strain elements) - Lumping of structural properties and loads - Calculation of stresses and assessment of error - formulation of bar Element - Formulation of isoperimetric continuous elements: quadrilateral and triangular elements - Formulation of structural elements: beams - axisymmetric and plate bending elements - Numerical integration: Gauss formula (one dimension integration) - Integration in two dimensions- Computer Applications using ANSYS Engineering Simulation Software.										
References	• G. Ramamurty, " Applied Finite Element Analysis", New Delhi: 2nd Edition, I.K. Inc, 2010, ISBN-13: 978-9380578453 • George R. Buchanan," Schaum's Outline of Finite Element Analysis", 2nd Edition, United State of America, McGraw Hill Inc., 2015 • Saeed Moaveni, "Finite Element Analysis: Theory and Application with ANSYS", 4th Edition, Pearson Global Edition, 2015, ISBN 13: 978-0-273-77430-3.										
Laboratory	Computer Applications using ANSYS Engineering Simulation Software										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 431	Computer Application in Geotechnical Engineering and Foundations	CIV 331	3	2	2	0	4	30	30	0	40
Course Contents	Introduction to Design Geotechnical problems and Foundations by Modern Methods - Material Modelling (Definition of Stresses – Definition of Strains – Elastic and Plastic Strains) – Soil Modelling (Mohr-Coulomb Model – Hardening Soil Model) - Numerical Analysis of Shallow and Deep Foundations – Computer Applications Examples using Modern Programs (Raft – Piles – Retaining Structure).										
References	• El-Kasaby, E. A., Engineering of Surface Foundations, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (19440/2015), ISBN 978 – 977 – 726 – 139 – 5, 2015. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Pijush Samui; Sunita Kumari; Vladimir Makarov; Pradeep Kurup, Modeling in Geotechnical Engineering, 1st Ed., ISBN 978 - 012- 821 – 205 – 9, 2021. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 339	Soil Mechanics & Foundations	CIV 259	3	2	2	0	4	10	30	20	40
Course Contents	The course aims to study soil characteristics and mechanics, and the selection and design of foundations: Soil Properties - Soil Classification - Soil Compaction - Stresses in Soil - Settlement of Soil - Lateral Earth Pressure - Shallow Foundations (Isolated Footing – Rectangular Footing) – Deep Foundations (Piles – Pile Caps).										
References	• El-Kasaby, E. A., Soil Mechanics, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (21371/2013), ISBN 978 – 977 – 726 – 041 – 1, 2014. • El-Kasaby, E. A., Engineering of Surface Foundations, Dar Al-Kutub Al-Almia, Cairo, 5th Ed., (19440/2015), ISBN 978 – 977 – 726 – 139 – 5, 2015. • El-Kasaby, E. A., Design and Construction of Deep and Special Foundations, Dar Al-Kutub Al-Almia, Cairo, 4th Ed., (10651/2016), ISBN 978 – 977 – 726 – 168 – 5, 2016. • Das, B. M, Soil Mechanics Laboratory Manual, Oxford University Press, 9th. Ed., ISBN 978 – 019 – 020 – 966 – 7, 2016. • Das, B. M, Principles of Foundation Engineering, Brooks - Cole, 9th. Ed., ISBN 978 – 133 – 770 – 502 – 8, 2017. • Bowles, J., Foundation Analysis and Design, McGraw - Hill, 5th. Ed., ISBN 978 – 007 - 912 – 247 – 7, 2009.										
Laboratory	Specific Gravity Determination, Atterberg Limits (Liquid Limit – Plastic Limit – Shrinkage Limit). Atterberg Limits (Liquid Limit – Plastic Limit – Shrinkage Limit), Grain Size Distribution - Coarse Grained Soils. (Sieve Analysis), Grain Size Distribution - Fine Grained Soils (Hydrometer Analysis), Determination of Natural Unit Weight of Soil (Sand Bottle Test - Core Cutter Test).										
Used in Program	Architecture Engineering Program			Semester			9				

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 441	Remote Sensing and Geographical Information System	CIV 241	3	2	2	0	4	30	30	0	40
Course Contents	Introduction to geographic information systems - remote sensing technologies - Active & passive remote sensing - Data structures – Map projections & coordinate systems - Processing of digital geographic information - Creation of digital elevation models – Visualization - Mapping of water and environmental features – Soil and land use mapping - Terrain analysis for hydrological and hydraulic modelling - Production of thematic maps - GIS as a decision support tool - Exercise and assignment.										
References	• Lillesand, T. M., Kiefer, R. W., and Chipman, J. W., (2007), "Remote Sensing and Image Interpretation', 6th ed. Madison: John Wiley & Sons. - ISBN: 978-1-118-34328-9 • Bonham-Carter, G.F., (1994), " Geographic Information Systems for Geoscientists: Modelling with GIS", Geological Survey of Canada, Love Printing Service Ltd, Ontario, Canada - eBook ISBN: 9780080571805. • Principles of geographical information systems for land resources assessment. P. A. Burrough. Publisher Oxford University press 1986 (paperback) (193 pp) ISBN 0 19 854592 4										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 443	Photogrammetry by Drones	CIV 241	3	2	2	0	4	30	30	0	40
Course Contents	Photogrammetry principles - Classifications of Photogrammetry according to the purpose - Classification of the Photogrammetry according to the sensor location - Space photogrammetry - Aerial Photogrammetry - Terrestrial Photogrammetry - Close Range Photogrammetry (CRP) - UAV Photogrammetry - UAV Classification - UAV images processing techniques and algorithms -Structure from motion (SFM).										
References	• Gruen, Armin, Baltsavias, Emmanuel, Henricsson, O. (Eds.) - Automatic Extraction of Man-Made Objects from Aerial and Space Images (II) - ISBN 978-3-0348-8906-3 • Faig, W. (1985), Lecture Notes on Aerial Triangulation and Digital Mapping, Monograph 10, School of Surveying, The University of New South Wales, Kensington, N.S.W., Australia – ISBN 0858390434 • Falkner, E.; Morgan, D., 2002. Aerial Mapping: Methods and Applications, 2nd ed.; CRC Press: Boca Raton, FL, USA - ISBN 1-56670-557-6										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 451	R.C. Structures Modelling	CIV 352	3	2	2	0	4	30	30	0	40
Course Contents	Analysis and Design of Post-Tension Slabs using commercial software programs. Modeling of Slab edges, opening, supporting elements. Loads input, tendon profiling, material properties, anchorage properties, dead and live tendon ends. Prestress loss data input. Load combinations. Check of Punching, shear, and deflection. Reinforcement detailing.										
References	• Egyptian Code for Design & Construction of Reinforced Concrete Structures – ECOP 203-2018. • Prestressed Concrete: 5th Edition, Edward G. Nawy, ISBN: 978-0136081500, 2009. • Design of Prestressed Concrete, Arthur H Nilson, 2nd Edition, 1991. • Software programs manual.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 461	Inland Navigation	CIV 162	3	2	0	2	4	30	30	0	40
Course Contents	Natural phenomena; wind, waves, Currents and tide - Vessels' specifications and movement - Planning of inland navigation projects Design of navigation channels cross section - Master plan of inland ports - Berthing facilities (quay walls) - Repairing facilities - Dredging and maintenance of navigation channels - Environmental impact of inland navigation.										
References	• Inland Navigation: Channel Training Works. Task Committee on Inland Navigation of the Waterways Committee of the Coasts, Oceans, Ports, and Rivers Institute of ASCE Edited by Thomas J. Pokrefke, P.E. ISBN: 978-0-7844-1253-4ISBN (PDF): 9780784477014 • https://doi.org/10.1061/9780784412534.fm Published online: May 06, 2013 • U. S. Army Corps of Engineers. Shore Protection Manual, 1977.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 463	Hydraulic Modelling	CIV 162	3	2	2	0	4	30	30	0	40
Course Contents	Governing Laws: Continuity principle , Momentum principle , Inertia forces, Momentum equations , Euler equation, Navier-Stokes equations , Bernoulli equation – 1D Channel Flow: Steady– Saint Venant equation for unsteady flow - Derivation of St Venant equation - Kinematic wave approximation - Applications of unsteady flow equations and solution methods- 2D and 3D Shallow Water Equations: Depth-averaged shallow water equations - Limit cases for depth-averaged flow and for 3D flow - Numerical models - Application software.										
References	• Computer Applications using ANSYS Engineering Simulation Software • Le Mehaute, B. (1976). An Introduction to Hydrodynamics and Water Waves, Springer Verlag, New Work. https://doi.org/10.1007/978-3-642-85567-2 eBook ISBN: 978-3-642-85567-2										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 471	Environmental Engineering	-	3	2	0	2	4	30	30	0	40
Course Contents	Introduction to environmental engineering, Philosophy of Environmental Controls – Emissions Control – Climate change – Environmental Impact Assessment – Sustainability – Sustainable water supply – Sustainable solid waste management – Nature and Sources of Air Pollution, Air: Quality, Environmental impact of Air pollution. Soil: Quality, Environmental impact of Soil pollution, Environmental laws and its applications.										
References	• US Environmental Protection Agency • Introduction to Environmental Engineering by Mackenzie Davis, David Cornwell, McGrawHill, Fifth Edition, 2012 • Environmental Engineering: Designing a Sustainable Future (Green Technology), by Anne E. Maczulak, Facts on File 2009, ISBN: 9780816072002, 0816072000, 9781438127477										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 473	Modelling of Water & Wastewater Networks	CIV 371	3	2	2	0	4	30	30	0	40
Course Contents	Modelling of water distribution systems, Analysis and design of water networks using computer applications, modelling of sewer systems, Analysis and design of Sewer Networks using computer applications, Applications										
References	• Haestad Methods Water Solutions, "Advanced Water Distribution Modeling and Management", Haestad, 2003 • Haestad Methods Water Solutions, "Wastewater Collection System Modeling and Design", Bentley institute press, 2007 • Different software package user guide manuals • U.M. Shamsi, "GIS Applications for Water, Wastewater, and Stormwater Systems ", CRC Press, 2005, ISBN 9780849320972. • Staff lectures notes										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 481	Highway Engineering II	CIV 381	3	2	0	2	4	30	30	0	40
Course Contents	Geometric design: At-grade intersection design - Interchange design - Capacity and level of service analysis on basic freeway and multilane highway segments - Capacity and level of service analysis of weaving, merge and diverge segments on freeways and multilane highways - Highway traffic safety. Structural design: Stresses in rigid pavement - Rigid pavement design - Asphalt concrete mix planet - Pavement layers construction - Pavement maintenance - Drainage.										
References	• Traffic and Highway Engineering, Nicholas Garber and Lester Hoel, Fifth Enhanced SI Edition, CENGAG Learning, 2020, ISBN-13: 978-1-337-63104-4. • Traffic Engineering, Roger P. Roess - Elena S. Prassas and William R. McShane, Fifth Edition, Pearson, 2019, ISBN-13: 978-9353434854. • AASHTO, A Policy on Geometric Design of Highways and Streets "Green Book", 7th Edition, ISBN-13: 978-1560516767. • Pavement Analysis and Design, Yang Huang, Second International Edition, Pearson, 2012, ISBN-13: 978-0-13-272610-8. • Hot Mix Asphalt Materials, Mixture Design and Construction, E. Ray and Prithvi S. Kandhal and Freddy L. Roberts and Y. Richard Kim and Dah-Yinn Lee and Thomas W. Kennedy Brown , Third Edition, National Asphalt Pavement Association Research and Education Foundation, 2009, ISBN-13 : 978-0914313021 • الكود المصرى للطرق – 2020.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 483	Computer Application in Transportation Engineering	CIV 381	3	2	2	0	4	30	30	0	40
Course Contents	This course focuses on the fundamentals behind some of the most popular computer software packages used in the planning, design, operations, and management of transportation systems. Topics includes: highway planning and design, pavement design, signal optimization, forecasting of traffic flows and passenger volumes, simulation of traffic and transit systems, design and evaluation of Intelligent Transportation Systems.										
References	The manual of the used software.										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lec	Lab	Tut	Sum	SA	MT	PE/OE	Final
CIV 499	Senior Design Project II	CIV 398	3	1	4	0	5	50	0	50	--
Course Contents	Topics are selected by students according to their area of interest upon advisor approval. Student deals with the analysis and design of a complete project using the skills he gained during his study. Project report presented by the student should include the details of the analysis and design satisfying the concerned codes requirements, the computer applications as well as the experimental work, when necessary, in addition to the technical engineering drawing of his design.										
References	According to the selected project										
Laboratory	According to the selected project										

Code	Course Title	Pre-req	Cr. Hrs.	Ct Hrs				Assessment			
				Lec	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 111	Differential Equations	BES 012	3	2	0	2	4	30	30	-	40
Course Content	Ordinary differential equations (ODEs): Classification and types of solutions of ODEs. Solution of first order ODEs - Applications of ODEs (Newtons law of cooling, electric circuits) - Solution of nth order ODEs (homogeneous and non-homogeneous) - System of first order linear differential equations - Series solution of differential equations- Laplace transforms and inverse Laplace transforms with applications - Fourier series with applications. Gamma and Beta functions Partial Differential Equations (PDEs): Classification and types of solutions of PDEs. Applications of PDEs. Solution of linear PDEs with constant coefficients, solution of some initial-boundary value problems. Solution of PDEs by Laplace Transforms.										
References	• Morris Tenenbaum, Harry Pollard, "Ordinary Differential Equations: An Elementary Textbook for Students of Mathematics, Engineering, and the Sciences", Dover Publications, Last Edition. • Wei-Chau Xie, Differential Equations for Engineers, CAMBRIDGE UNIVERSITY PRESS, 2010.										

Code	Course Title	Pre-req	Cr. Hrs.	Ct Hrs				Assessment			
				Lec.	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 112	Numerical Analysis	BES 111	3	2	2	0	4	10	30	20	40
Course Content	Numerical in general: Errors, norms, Numerical solution of a system of linear and nonlinear equations. matrix eigenvalues, least square method (Curve fitting), Interpolations, Numerical differentiation and integration. Numerical ODEs and PDEs: methods for the solution of initial value problems in 1st order ODEs and higher order ODEs, Finite difference methods for boundary value problems in ODEs and initial-boundary value problems for PDEs (Elliptic and parabolic PDEs)- Lab simulations of engineering applications										
References	• R W Hamming, "Numerical Methods for Scientists and Engineers", Courier Dover Publications, Last Edition. • Steven C. Chapra, "Applied Numerical Methods with MATLAB for Engineers and Scientists", Mcgraw-Hill, 3rd edition. • Nita H. Shah, Numerical Methods with C++ Programming, PHI Learning, 2008.										
Laboratory	Lab simulations by software's as (C++, Matlab, Python,…)- Simulating practical technical problems- linear equations due to electric circuits , truss and spring mass systems. - Electric charge calculations- Nonlinear structural problems- Deflection of nonlinear springs- Calculating the shrinkage of a trunnion- Finding the longitudinal Young's modulus -Estimating voltage drop on a resistor- Calculating the work done by stretching a string- Simulating equations due to the fluid continuum problems, DC motor speed control problems- interpolation and fitting for signals and voltage current relations- population growth calculations- Fluid flow rate calculations- Distributed wind force problems										

Code	Course Title	Pre-req	Cr. Hrs.	Ct Hrs				Assessment			
				Lec	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 211	Engineering Statistics and Probability	BES 012	3	2	2	0	4	10	30	20	40
Course Content	Probability: Obtaining Data - Probability models: mathematical, deterministic model. Probability theory concepts. - Discrete Distributions: Binomial and Poisson distribution. Continuous Distributions: Normal and Exponential Distribution. - Joint distributions. Statistics and Estimation: central point theorem, Single and multiple confidence interval, Prediction interval, tolerance interval - Hypothesis testing, - Inferences on the mean and variance of Normal distribution, Inference of two samples. – Simple and multiple Linear Regression and Correlation. - Applications involving uniform, Gaussian. Markov chains - Queueing Theory - Course examples are drawn from signal processing, system reliability, data science, wireless communications, civil engineering, and mechanical engineering - Lab simulations of engineering applications.										
References	• R. E Walpole, R. H. Myers, "Probability and Statistics for Engineers and Scientists", Macmillan Publishing, Last Edition. • David Levine, Patricia Ramsey, Robert Smidt, "Applied Statistics for Engineers and Scientists: Using Microsoft Excel & Minitab", First Edition, 2000.										
Laboratory	Lab simulations by software's as (Excel, Matlab, Python,…)- Exploratory data analysis and data transformation (Tabulated data summaries and statistics, Histograms, Box and Correlation plots, Computation of means, variances, etc, Missing data imputation)- Simple random sampling with and without replacement- Stratified random sampling- Simulating Bernoulli process and Poisson distribution - Simulating Markov chains applications-Binary and sequential hypothesis testing and gambler's ruin -Gaussian Mixture Models, clustering and anomaly detection- Regression models and inference- Time series forecasting and ARIMA models.										

Code	Course Title	Pre-req.	Cr. Hrs.	Ct Hrs				Assessment			
				Lec	Lab	Tut	Tot	SA	MT	PE/OE	Final
BES 148	Water Chemistry	BES 041	3	2	2	1	5	10	30	20	40
Course Contents	This course aims to provide an introduction of equilibrium chemistry principles in aquatic systems. This course is designed for engineering students who are often required to understand the composition of solutions and direction of changes during treatment or in environmental systems. By completion of the course, the student will be able to interpret and communicate results related to water quality. Therefore the course syllabus includes the following topics: equilibrium principles of acids-bases, dissolution-precipitation, titration, gas-liquid equilibrium, oxidation-reduction, complexation and water quality analysis and quality control.										
References	- Sawyer, McCarty & Parkin, Chemistry for Environmental Engineering, McGraw Hill, 2003 - Stumm & Morgan, aquatic Chemistry. Third edition, John Wiley&Sons. 1995										
Laboratory	- Acid – base titration, Total hardness, Total alkali, conductivity, Total dissolved solids										

Code	Course Name	Pre-req.	Cr. Hrs.	Ct. Hr.				Assessment			
				Lect.	Lab.	Tut.	Sum	St. Act.	MT	PE/ OE	Final
ARC 217	Architectural Engineering	CIV 101	3	2	0	2	4	30	30	0	40
Course Contents	The course focuses on the relation between building materials and the related adequate construction systems. Students study the basic elements of the building (roofs - floors - walls) and understand. The architectural and services elements of buildings (Function - Finishes - Building materials - Stairs - Elevators). This course provides the students with the fundamental skills and understanding the architectural drawings (Axes - Interior and exterior dimensions - Finishes tables…).										
References	• Ching, Francis D.K., Building Construction Illustrated, Van Nostrand Reinhold, 2008, ISBN-13: 978-0470087817. • Highfield, David, Refurbishment and Upgrading of Building, London: E&FN Spon, 2000, ISBN13: 978–0–203–87916–0. • Hardy, Steve, Time – Saver, Details for Roof Design, New York: McGraw-Hill,1997, ISBN-13: 978-0070263680. • McKay W.B., Building Construction, Volume 1, Longman, 1971, ISBN-13: 978-0582422155.										
Used in Program	Civil Engineering Program						Semester	5			