Nile University

جامعة النيل

كلية هندسة الاتصالات وتكنولوجيا المعلومات

اللائحة الداخلية

لمرحلة البكالوريوس

مادة (1): رسالة الكلية

تسعى كلية الاتصالات وتكنولوجيا المعلومات بجامعة النيل إلى تزويد الخريجين بالأساسيات النظرية والتطبيقات اللازمة لحل المشكلات بطريقة علمية والوعى بالدور الهام الذى تقوم به الهندسة فى المجتمع التكنولوجى الحديث.

مادة (2): المستوى الأكاديمى المرجعى

يحصل الطالب على درجة البكالوريوس بعد استكمال عدد الساعات المعتمدة اللازم (172 ساعة معتمدة) في المواد المقررة والتي تتيح لخريج الكلية:

1. الإلمام التام بقواعد الرياضيات ومنها التفاضل والتكامل والاحتمالات.
2. تصميم والقيام بالتجارب وتحليل وترجمة النتائج.
3. المعرفة اللازمة للتعامل مع الآخرين والمعلومات الهندسية العامة اللازمة للعمل ضمن فريق.
4. فهم المسئوليات الأخلاقية والمهنية.
5. الحصول على مهارات التواصل الشفهى والتحريرى فى المجالين الفنى وغير الفنى.
6. اكتساب التعليم العام اللازم لفهم أهمية الحلول الهندسية في إطار المجتمع العالمى.
7. التعرف على أهمية القدرة والانشغال بالتعليم في جميع مراحل العمر.
8. التعرف على الأمور التى تشغل العالم الحديث.

مادة (3): الأقسام العلمية بالكلية

تتكون الكلية من الأقسام العلمية التالية:

1. قسم هندسة الحاسبات
2. قسم هندسة الالكترونيات والاتصالات

مادة (4): اختصاصات الأقسام العلمية

يدخل فى اختصاص كل قسم تدريس المقررات وإجراء البحوث الخاصة بالمواد التالية:

1. **قسم (برنامج) هندسة الحاسبات** ويتولى تدريس مقررات فى التخصصات التالية: هندسة الحاسبات ، أسس الدوائر الرقمية والتناظرية ، تصميم الدوائر المتكاملة ، تنظيم الحاسبات ، بنية الحاسبات ، برمجة الحاسبات ، نظم وإشارات ، أسس التحكم ، شبكات الحاسبات ، نظم التشغيل ، قواعد البيانات ، هندسة البرمجيات ، النظم الدفينة .
2. **قسم (برنامج) هندسة الالكترونيات والاتصالات** ويتولى تدريس مقررات فى التخصصات التالية: الالكترونيات ، تصميم و تحليل الدوائر الرقمية والتناظرية، تصميم الدوائر المتكاملة ، تصميم دوائر الاتصالات ، الكهرومغناطيسية ، نظم وإشارات ، أسس و نظم التحكم ، أسس الموصلات الجزئية ، النظم الدفينة ، نظم الاتصالات ، الاتصالات الرقمية ، الاتصالات اللاسلكية .

مادة (5): الإشراف على المقررات العامة

يعهد مجلس الكلية إلى كلية الإدارة فى الإشراف على المقررات العامة والخاصة بالإنسانيات والعلوم الاجتماعية وهى: موضوعات مختارة في العلوم الإنسانية والفنون ، موضوعات مختارة في العلوم الاجتماعية ، التراث العربى والمصرى ، التنوع وثقافات العالم المختلفة.

مادة (6): منح الدرجات العلمية

تمنح جامعة النيل بناء على طلب مجلس كلية الاتصالات وتكنولوجيا المعلومات درجة البكالوريوس فى أحد الفروع التالية:

1. هندسة الحاسبات
2. هندسة الالكترونيات والاتصالات

مادة (7): شروط القيد

- يسمح بالقيد للحاصلين على شهادة الثانوية العامة شعبة رياضيات ، أو ما يعادلها ، ممن تم قبولهم طبقا لقواعد ولوائح مجلس الجامعات الخاصة.
- تضع الكلية قواعد عامة للقبول بحيث تكون رغبة الطالب ومبدأ تكافؤ الفرص هى الأساس فى قبول طلاب بنظام الدراسة فى هذه اللائحة.

مادة (8): نظام الدراسة

- الدراسة بنظام الساعات المعتمدة، وتحسب ساعات التدريس كالتالى: الساعة المعتمدة تعادل ساعة محاضرة، أو فى المتوسط ساعتين تمارين أو معمل.
- الدراسة باللغة الإنجليزية. ويتم عقد امتحان لتحديد مستوى الطالب وتحديد المقررات التأهيلية التى يحتاجها فى اللغة.

مادة (9): مواعيد الدراسة والقيد

- تقسم السنة الدراسية إلى ثلاثة فصول دراسية على النحو التالى:

الفصل الأول: لمدة 15 أسبوع

الفصل الثانى: لمدة 15 أسبوع

الفصل الصيفى: ولمدة 6 أسابيع

يتم القيد لأى مرحلة خلال أسبوعين قبل بدء أى فصل دراسى بعد استيفاء شروط القيد ودفع الرسوم المقررة.

مادة (10): مدة الدراسة

- الحد الأدنى لمدة الدراسة عشرة فصول رئيسية ، والطالب الذى يدرس مقررات فى فصول صيفية يمكنه إنهاء المتطلبات قبل ذلك بفصل واحد على الأكثر.

مادة (11): رسوم الدراسة

- يتم تحديد رسوم الخدمة التعليمية المقررة ، لكل ساعة معتمدة ، بمعرفة الجامعة بناء على اقتراح مجلس الكلية سنويا.
- يوقع الطلبة على تعهد بالالتزام بدفع رسوم الخدمة التي تقترحها الكلية، وتوافق عليها الجامعة، مع الالتزام بنفس الرسوم للطالب منذ التحاقه وحتى تخرجه.
- تحصل رسوم الخدمة التعليمية كل فصل دراسى، وتقدر قيمة رسوم الخدمة التعليمية بعدد الساعات التى يسجل فيها الطالب كل فصل دراسى (الفصل الأول والفصل الثانى) ، وبحد أدنى ما يقابل رسوم خدمة تعليمية لعدد 12 ساعة معتمدة فصليا. وتكون رسوم الخدمة التعليمية للفصل الصيفى معتمدة على عدد الساعات المعتمدة التى سجل فيها الطالب.

مادة (12): شروط التسجيل

- يمكن للطالب التسجيل في الفصل الأول أو الثانى فى مقررات تصل ساعاتها المعتمدة الى 19 ساعة. ويمكن للطالب التسجيل فى الفصل الصيفى فى مقررات لا تزيد ساعاتها المعتمدة عن 7 ساعات ، وبحيث يستوفى شروط التسجيل في كل مقرر، وبعد استشارة المرشد الأكاديمي ، وفى المواعيد المحددة بتوقيتات التسجيل وقواعده التى تصدرها الكلية سنويا وتنشر فى دليل الطالب ، ولا يعتبر التسجيل نهائيا إلا بعد دفع رسوم الخدمة التعليمية المقررة كل فصل دراسى .

- يجوز السماح للطالب وبموافقة المرشد الأكاديمى التسجيل فى ساعات معتمدة إضافية بحد أقصى 21 ساعة معتمدة بشرط أن يكون المعدل التراكمى للطالب أعلى من 3.0 وألا يكون ذلك خلال السنة الأولى.

- الطالب الذى يقل متوسط مجموع درجاته عن 2.0 يسمح له بالتسجيل فى مواد بحد أقصى 13 ساعة معتمدة فى الفصل الدراسى الواحد. وفى هذه الحالة يوضع الطالب تحت الملاحظة.

- الطالب المتأخر عن مواعيد التسجيل ، لا يعد تسجيله في المقررات الدراسية نهائيا ، إلا إذا كان هناك مكان ، ويدفع رسوم تأخير تسجيل بالإضافة إلى رسوم الخدمة التعليمية المقررة.

- لا يجوز للطالب التسجيل فى مقرر لها متطلبات سابقة ، قبل استيفاء شروط النجاح فى المقررات السابقة.

- يمكن تسجيل طلاب كمستمعين فى بعض المقررات ، لو كان هناك مكان لهم ، وذلك بعد تسجيل الطلاب النظاميين ، ولا يحق لهم دخول الامتحان أو الحصول على شهادة بالمقررات.

- يمكن لمجلس الكلية تعديل المتطلبات السابقة للمقررات إذا اقتضت الحاجة لذلك .

مادة (13): متطلبات الدراسة

تحتوى البرامج المقدمة بالكلية على متطلبات مشتركة للجامعة والكلية باللإضافة إلى المتطلبات الخاصة بالتخصصات ، على النحو التالى:

الدرجة	الهندسة الالكترونيات والاتصالات Electronics & Communications Engineering	النسبة المئوية	هندسة الحاسبات Computer Engineering	النسبة المئوية
الإنسانيات واللغة Language, Humanities and Social Sciences	21	%12	21	%12
العلوم الأساسية Mathematics & Basic Sciences	37	%21	37	%21
العلوم الهندسية الأساسية Basic Engineering Sciences	36	%21	36	%21
التطبيقات الهندسية والتصميم Applied Engineering & Design	36	%21	36	%21
تطبيقات الحاسب وتكنولوجيا المعلومات Computer Applications and ICT	15	%9	15	%9
مشروعات وتطبيقات عملية Projects & Practice	15	%9	15	%9
المجموع Subtotal	**160**	%93	**160**	%93
مقررات مميزة للجامعة Discretionary Subjects (Institution character Identifying)	12	%7	12	%7
مجموع الساعات المعتمدة	**172**	**%100**	**172**	**%100**

مادة (14):متطلبات الحصول على درجة البكالوريوس

- للحصول على درجة البكالوريوس فى العلوم الهندسية ، لابد أن يجتاز الطالب عدد 172 ساعة معتمدة ، طبقا للمتطلبات التى تعرضها هذه اللائحة ، وبمتوسط نقاط لا يقل عن 2.00

- يطلب من الطالب تقديم مشروع للتخرج ، كما هو موضح فى هذه اللائحة ، ويجوز أن يكون المشروع مقسما على فصلين دراسيين متتاليين، ولا يتخرج الطالب إلا بعد أن يستوفى شروط النجاح فى المشروع.
- يؤدى الطالب تدريبا عمليا تحت إشراف الكلية.

مادة (15): المرشد الأكاديمى

- يعين مجلس القسم ، لكل طالب ، عند التحاقه بالدراسة ، مرشدا أكاديميا من بين أعضاء هيئة التدريس ، يمكن أن يستمر معه حتى نهاية الدراسة.
- يلتزم المرشد الأكاديمى بمتابعة أداء الطالب ، ومعاونته فى اختيار المقررات كل فصل دراسى ، وأن يطلب وضع الطالب تحت الملاحظة لفصلين دراسيين، مع خفض عدد الساعات المسجل فيها وبحد أقصى 13 ساعة معتمدة.

مادة (16): شروط التعديل والإلغاء والانسحاب

- يحق للطالب تغيير مقررات ، سجل فيها ، بأخرى ، خلال أسبوعين من بدء الدراسة ، ولا يسرى ذلك على الفصل الصيفى.
- يحق للطالب الانسحاب من المقرر (ولا ترد له الرسوم)، قبل إنقضاء 80% من مدة الفصل الدراسى على الأكثر.
- الطالب الذى يرغب فى الانسحاب من فصل دراسى ، لظروف المرض أو بعذر تقبله الكلية، عليه التقدم بطلب لشئون الطلاب ، ويحصل على موافقة على الانسحاب ولاتدخل له هذه المقررات في حساب المتوسط العام ، على أن يقوم بإعادة المقررات التى سجل فيها فى فصل دراسى لاحق .
- يحق للطالب إعادة التسجيل في أى مقرر رسب فيه ، ويعيد المقرر دراسة وامتحانا ، بعد دفع رسوم الخدمة التعليمية المقررة .

مادة (17): تقديرات مقررات متطلبات الدراسة

- تقدر نقاط كل ساعة معتمدة على النحو التالى:

التقدير	عدد النقاط	التقدير
A+	4.00	Excellent
A	4.00	Excellent
A-	3.70	Excellent
B+	3.30	Very Good
B	3.00	Very Good
B-	2.70	Good
C+	2.30	Good
C	2.00	Pass
C-	1.70	Conditional Pass
D+	1.30	Conditional Pass
D	1.00	Conditional Pass
F	0.00	Fail

مادة (18): حساب متوسط النقاط

- لا يعتبر الطالب ناجحا في أى مقرر إلا إذا حصل على تقدير D على الأقل.
- لابد من نجاح الطالب فى المقررات التي تعتبر متطلبات لمقررات تالية ، قبل التسجيل فى تلك المقررات.
- لا يحصل الطالب على البكالوريوس إلا إذا حقق متوسط نقاط قدره 2.00 على الأقل.
- يحسب مجموع النقاط التي حصل عليها الطالب فى أى فصل دراسى، على أنها مجموع نقاط كل المقررات التى درسها فى هذا الفصل الدراسى.
- يحسب متوسط نقاط أى فصل دراسى، على أنه ناتج قسمة مجموع النقاط التى حصل عليها الطالب فى هذا الفصل، مقسوما على مجموع الساعات المعتمدة لهذه المقررات.
- المقرر الذى يحصل فيه الطالب على أقل من D ، يتم اعتباره فى متوسط النقاط ولا يعتد به ضمن الساعات المعتمدة المقررة ، إلا إذا أعاده ونجح فيه فتحسب الأخيرة فقط وبحد أقصى B.

- يسمح للطالب بإعادة مواد مختلفة بحد أقصى 12 ساعة معتمدة. إذا استهلك الطالب الحد المسموح للإعادة وحصل على(C) ، يحق له الإعادة مرة أخرى ولكن فى هذه الحالة تدخل درجتي مرتي الإعادة فى حساب متوسط مجموع الدرجات وتظهر الاثنتان فى الشهادة.

- يسمح للطالب ، فيما عدا حالات الغش، بإعادة مادة أو استبدالها بأخرى مرة واحدة لتحسين درجته فيها بعد موافقة القسم المختص بتلك المادة. وفى هذه الحالة تدخل الدرجة الجديدة في حساب مجموع الدرجات، وتظهر الدرجة السابقة فى الشهادة ولكن لا تدخل فى حساب متوسط مجموع الدرجات.

- يحق للطالب الراسب بسبب الغش إعادة المادة ولكن تظهر الدرجتان فى شهادته حتى إذا لم يستهلك 12 ساعة معتمدة من المواد المعادة.

- يحسب متوسط نقاط التخرج (بعد نجاحه في مجمل متطلبات التخرج)، على أنها ناتج قسمة مجموع كل نقاط المقررات التى درسها الطالب (بغض النظر عن نتيجة الامتحان ، سواء نجح أو رسب فيها) على مجموع الساعات المعتمدة لهذه المقررات.

مادة (19): تقديرات المقررات التى لا تحسب ضمن المتطلبات

- المقررات التى يسجل فيها الطالب كمستمع ، أو التى يطلب فيها النجاح فقط ، أو لم يكملها لسبب قبلته الكلية ، ولا تدخل في حساب متوسط النقاط ، ويرصد له أحد التقديرات التالية:

التقدير	المدلول	
S	Satisfactory	مرض
U	Unsatisfactory	غير مرض
W	Withdrew	انسحاب
AU	Audit	مستمع
F	Fail	راسب
P	Pass	ناجح

مادة (20): تعريف حالة الطالب

كلما أكمل الطالب 20% من متطلبات التخرج ، كلما اعتبر منتقلا من مستوى إلى مستوى أعلى منه ، ولا يتطلب ذلك تحديد نوعية أو مستوى المقررات التى أكملها الطالب ، ويعتبر ذلك نوعا من تعريف لموقع الطالب بالكلية حسب ما يلى:

تعريف موقع الطالب بنظام الدراسة	عدد الساعات المعتمدة التى اجتازها الطالب بنجاح	
	>=	<
Freshman	34	0
Sophomore	68	34
Junior	102	68
Senior 1	136	102
Senior 2	170	136

مادة (21): أسلوب تقييم الطالب

- توضح التفاصيل الموضحة بهذه اللائحة وتوزيع درجات كل مقرر بين: أعمال سنة ، عملي/شفوى، امتحان نصف الفصل ، الامتحان التحريرى النهائى.
- يعقد لكل مقرر امتحان تحريرى نهائى في نهاية الفصل الدراسى، لا تقل درجته عن 40% من مجموع درجات تقييم المقرر، باستثناء مشروع التخرج.
- لابد أن يحضر الطالب نسبة لا تقل عن 80% من المحاضرات والتمارين والمعامل وإلا يعد الطالب راسبا ويحصل على تقدير F.
- يعد الطالب راسبا إذا حصل في مجموع درجات المقرر على تقدير F.
- عند إعادة الطالب لأى مقرر، فإنه يعيده دراسة وامتحانا، ويقيم مرة أخرى بالكامل، وتحسب له نقاط المقرر فى الإعادة.
- يجوز للمرشد الأكاديمى طلب إعادة الطالب لبعض المقررات التى نجح فيها من قبل أو إضافة مقررات جديدة له ، بغرض رفع متوسط النقاط ليحقق متطلبات التخرج.

مادة (22): مراتب الشرف ومنح التفوق

تمنح مرتبة الشرف للطالب الذى لا يقل معدله التراكمى عن 3.40 خلال جميع فصول الدراسة ببرامج الساعات المعتمدة ، ويشترط ألا يكون الطالب قد حصل على تقدير F في أى مقرر خلال دراسته بالكلية. تضع الكلية نظاما لتشجيع المتفوقين بنسب متدرجة مع المعدل التراكمى.

مادة (23): التحويل بين البرنامج

يجوز للطالب طلب التحويل إلى البرامج محل هذه اللائحة ، من البرامج التي تطرحها نفس الكلية أو كليات أخرى بالجامعة ، وذلك قبل وصول الطالب إلى مرحلة الـ Senior ويجوز تحويل الساعات المعتمدة المشتركة بين البرنامجين ، وبعد موافقة مجلس القسمين أو الكليتين.

مادة (24): التحويل من جامعات أخرى

- لتحويل الساعات المعتمدة لمادة من جامعة أخرى ، يجب على الطالب أن يكون حاصلا على الأقل على 2.0 في المادة. ويقرر القسم المختص عدد الساعات الدراسية المحتسبة للتحويل. ويعود قرار قبول الطالب في نفس التخصص إلى رئيس القسم.
- إذا كان الطالب محولا من جامعة لا تستخدم نظام الساعات الدراسية المعتمدة، يتم حساب درجاته في المواد المحولة وفقا للجدول التالي:

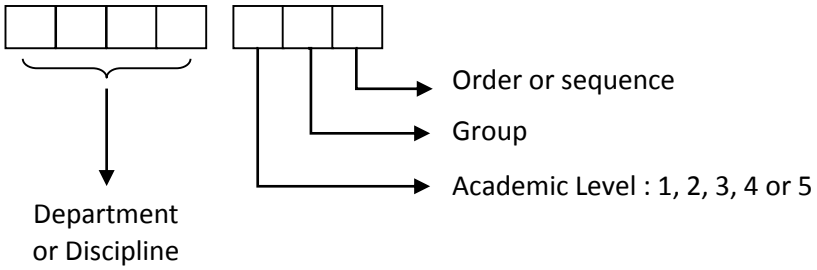
نظام الفصلين الدراسيين		نظام الساعات المعتمدة	
التقدير	النسبة المئوية	عدد النقاط	التقدير
امتياز	97% to 100%	4.00	A+
	90% to 97%	4.00	A
	85% to 90%	3.70	A-
جيد جدا	80% to 85%	3.30	B+
	75% to 80%	3.00	B
جيد	70% to 75%	2.70	B-
	65% to 70%	2.30	C+
مقبول	62% to 65%	2.00	C

مادة (25): قواعد إضافية

يعرض على مجلس الكلية كافة الموضوعات التى لم يرد فى شأنها نص فى مواد هذه اللائحة ، وقد يتطلب الأمر الرفع إلى الجامعة للتصديق على قرار مجلس الكلية .

جدول النظام الكودي للمقررات الدراسية

Course Coding System



No.	Department or Discipline	Code
1	English language	ENGL
2	Humanities	HUMA
3	Social Sciences	SSCI
4	Natural Sciences	NSCI
5	Internship & Community Service	COMM
6	Computer Science	CSCE
7	Mathematics	MATH
8	Physics	PHYS
9	Chemistry	CHEM
10	General Engineering	ENGR
11	Electrical & Computer Engineering	ECEN
12	Industrial Engineering	IENG
13	Mechanical Engineering	MENG

Discipline	General Education	Engineering Core	Program Requirements			
			ECE	CE	ISEM	ME
ENGL	5	-	-	-	-	-
HUMA	3	-	-	-	-	-
SSCI	3	-	-	-	-	-
NSCI	1	-	-	-	-	-
COMM	1	-	-	-	-	-
CSCE	1	1	-	-	-	-
MATH	2	4	-	-	-	1
PHYS	-	2	-	-	-	-
CHEM	-	1	-	-	-	-
ENGR	-	5	-	-	-	-
ECEN	-	1	23	23	-	-
IENG	-	2	-	-	23	-
MENG	-	1	-	-	-	25

COMPUTER ENGINEERING
AND
ELECTRONICS & COMMUNICATIONS ENGINEERING
PROGRAMS

University General Education Requirements

Course #	Course Name	#hrs
ENGL 100	Intensive English	0
ENGL 101	English 101	3
ENGL 102	English 102	3
ENGL 201	Writing Skills	3
ENGL 202	Communication & Presentation Skills	3
Total Number of Credits		12

Course #	Course Name	#hrs
CSCE 101	Computer & Information Skills	3
MATH 111	Analytical Geometry & Calculus I	4
MATH 201	Introduction to Probability & Statistics	3
HUMA 101	Introduction to Logic, Critical Thinking	2
HUMA 102	Introduction to Ethics	1
Total Number of Credits		13

Course #	Course Name	#hrs
NSCI 102	Selected Topics in Natural Sciences	3
SSCI 103	Selected Topics in Social Sciences	3
HUMA 103	Selected Topics in Humanities & Arts	3
NSCI, SSCI, or HUMA***	An elective course in one of the three categories	3
SSCI 101	Selected Topics in Egyptian & Arab Heritage	3
SSCI 102	Selected Topics in World Cultures & Diversity	3
COMM 401	Internship & Service Learning	3
Total Number of Credits		21

Total Number of Credits for University General Education Requirements	**46**

Engineering Core Requirements			
	Course #	Course Name	#hrs
Introduction to Engineering	ENGR 101	Introduction to Engineering Disciplines	3
	ENGR 102	Engineering Design	3
Mathematics	MATH 112	Calculus II	4
	MATH 203	Differential Equations	4
	MATH 301	Linear Algebra	4
	MATH 302	Probability & Statistics for Engineers	4
Physics	PHYS 101	Physics I (including lab)	4
	PHYS 102	Physics II (including lab)	4
Electrical & Computer Engineering	ECEN 101	Electric Circuits	3
Computer Science	CSCE 201	Introduction to Programming	3
Mechanics	MENG 101	Engineering Mechanics	3
Chemistry	CHEM 101	Chemical Principles	3
Industrial Engineering	ENGR 201	Solid Modeling & Workshop	3
	IENG 302	Safety Engineering	3
	IENG 301	Engineering Economics	3
Capstone Project	ENGR 540	Graduation Project I	3
	ENGR 541	Graduation Project II	3
Total Number of Credits for Engineering Education Requirements			57

Computer Engineering Required Courses 57 Cr hr			
All Computer Engineering Majors must take the following 19 courses.			
	Course #	Course Name	#hrs
Fundamentals	ECEN 202	Fundamentals of Electrical Engineering	3
	ECEN 203	Fundamentals of Computer Engineering	3
	ECEN 303	Introduction to Computer Systems	3
	ECEN 307	Fundamentals of Data Structures & Algorithms	3
Circuits & Electronics	ECEN 301	Analysis & Design of Analog Circuits	3
	ECEN 302	Analysis & Design of Digital Circuits	3
Communications	ECEN 306	Fundamentals of Communications	3
	ECEN 401	Introduction to Computer Networks	3
Electric Machines	ECEN 403	Electric Machines	3
Signals & Systems	ECEN 305	Signals & Systems	3
Control	ECEN 406	Fundamentals of Control	3
Computer Hardware	ECEN 402	Introduction to Computer Architecture	3
	ECEN 409	Microprocessor System Design	3
	ECEN 408	Advanced Computer Architecture	3
Computer Software	ECEN 304	Fundamentals of Computer Systems Software	3
	ECEN 404	Introduction to Database Systems	3
	ECEN 407	Operating Systems	3
	ECEN 501	Machine Intelligence	3
	ECEN 502	Introduction to Computer Security	3
Total number of required CE credits			**57**

Computer Engineering Technical Electives		
Computer Engineering majors must choose four courses from the following CE technical elective list.		
Course #	Course Name	#hrs
ECEN 521	Embedded System Engineering	3
ECEN 522	Embedded Real-Time Systems	3
ECEN 523	Digital Signal Processing	3
ECEN 524	Image Processing & Bio-Image Informatics	3
ECEN 525	Mechatronic Design	3
ECEN 526	Wireless and Mobile Networks	3
ECEN 527	Software Engineering	3
ECEN 528	Numerical Methods & Math Precision	3
ECEN 529	Compiler Construction	3
ECEN 530	Introduction to Parallel Computing	3
ECEN 550	Selected Topics in Computer Engineering	3

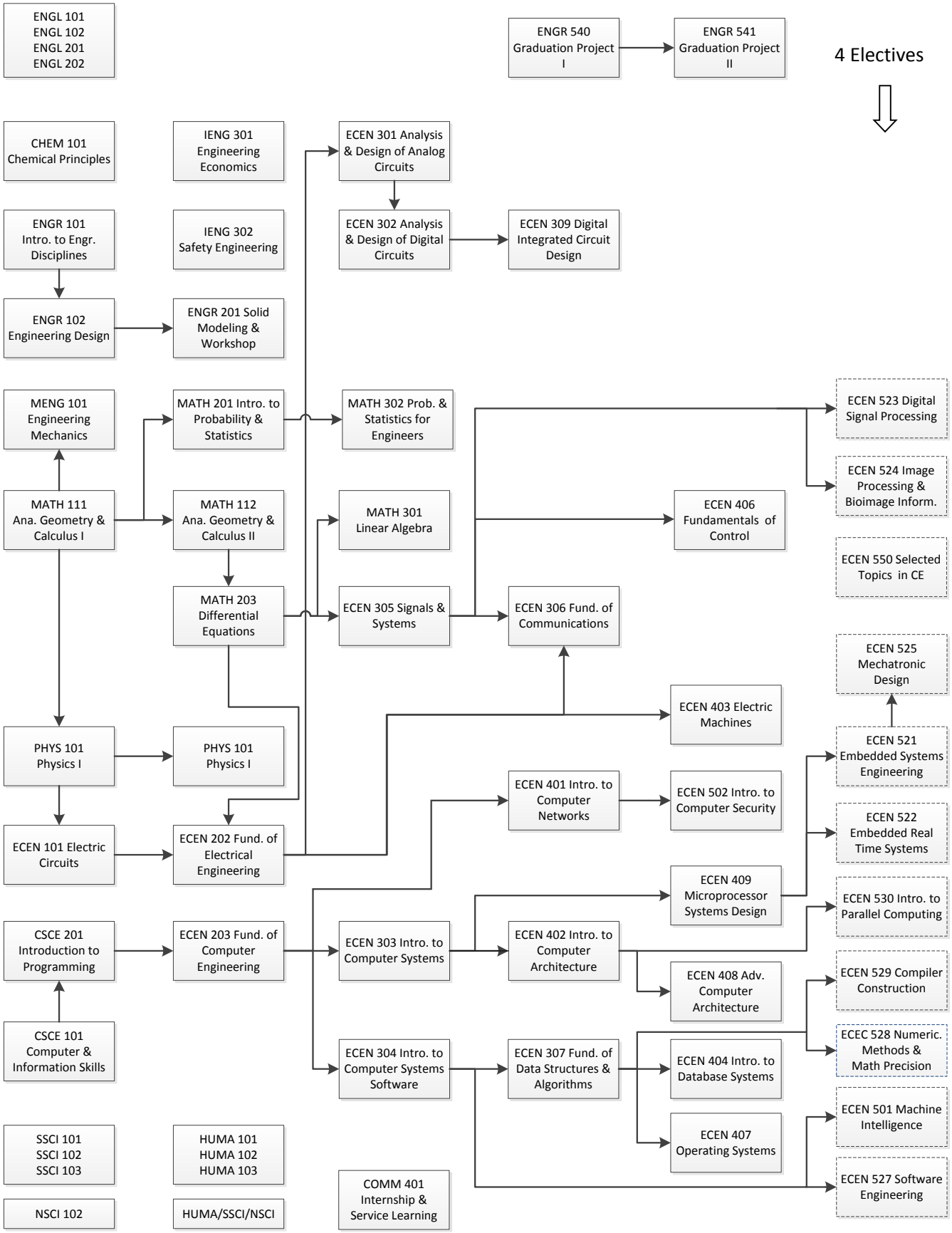
University General Education Requirements	46
Engineering Education Requirements	57
Total CE Required Credits	57
Total Number of Elective Credits	12
Total Number of Credits for B. Sc. in CE	**172**

Electronics & Communications Engineering Required Courses 57 Cr hr			
All Electronics & Communications Engineering Majors must take the following 19 courses.			
	Course #	Course Name	#hrs
Fundamentals	ECEN 202	Fundamentals of Electrical Engineering	3
	ECEN 203	Fundamentals of Computer Engineering	3
Circuits & Electronics	ECEN 301	Analysis & Design of Analog Circuits	3
	ECEN 302	Analysis & Design of Digital Circuits	3
	ECEN 309	Digital Integrated Circuit Design	3
Devices	ECEN 308	Fundamentals of Semiconductor Devices	3
	ECEN 411	Physical Sensors, Transducers & Instrumentation	3
Computer	ECEN 303	Introduction to Computer Systems	3
	ECEN 409	Microprocessor System Design	3
Electromagnetics	ECEN 310	Fundamentals of Electromagnetics	3
	ECEN 412	Applied Electromagnetics	3
Electric Machines	ECEN 403	Electric Machines	3
Signals & Systems	ECEN 305	Signals & Systems	3
Control	ECEN 406	Fundamentals of Control	3
	ECEN 503	Embedded & Discrete Control Systems	3
Communications	ECEN 306	Fundamentals of Communications	3
	ECEN 413	Digital Communications	3
	ECEN 504	Wireless Communications	3
	ECEN 414	Communications Networks	3
Total number of required ECE credits			**57**

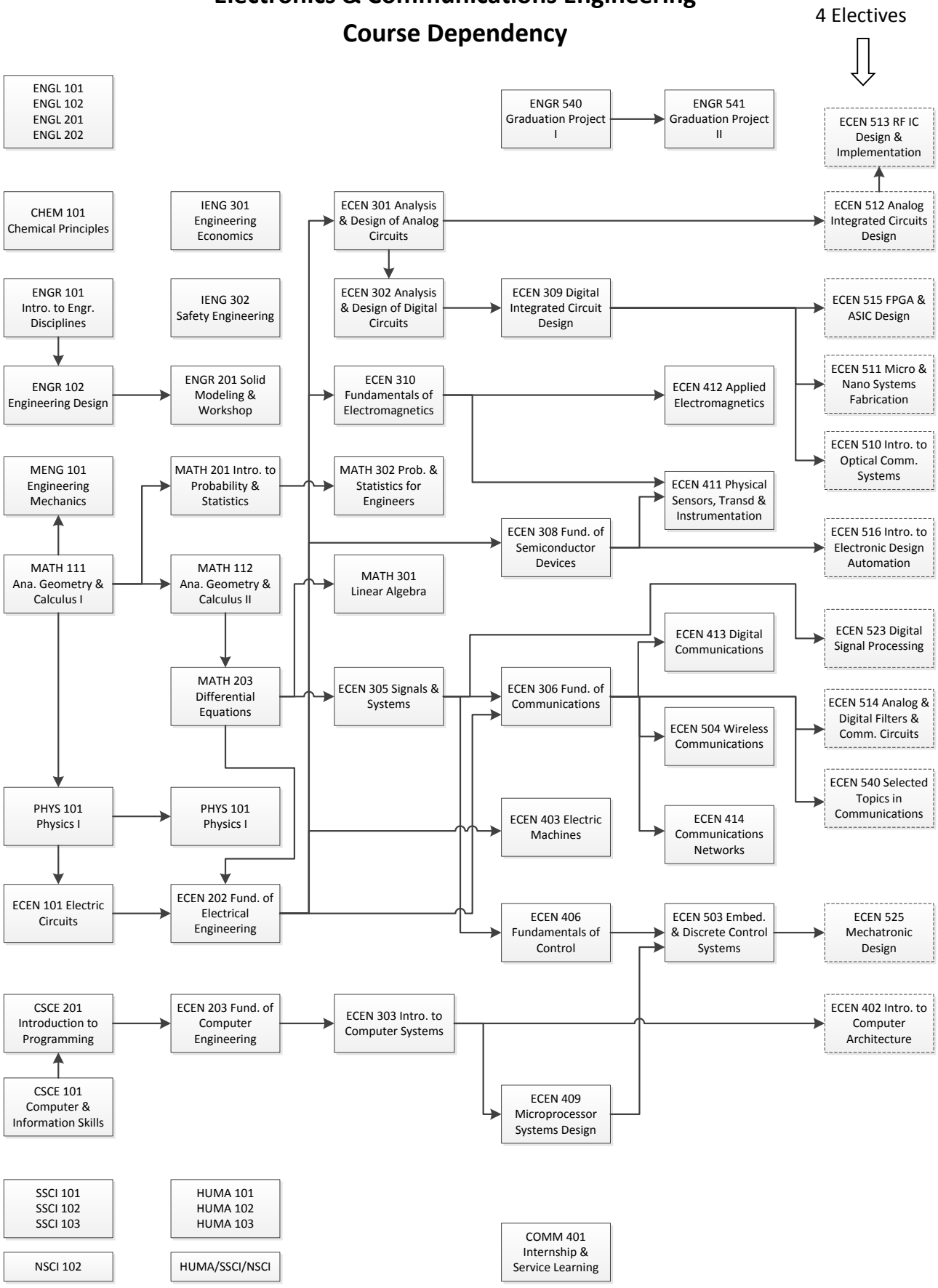
Electronics & Communications Engineering Technical Electives		
Electronics & Communications Engineering majors must choose four courses from the following ECE technical elective list.		
Course #	Course Name	#hrs
ECEN 402	Introduction to Computer Architecture	3
ECEN 510	Introduction to Optical Communication Systems	3
ECEN 511	Micro & Nano Systems Fabrication	3
ECEN 512	Analog Integrated Circuit Design	3
ECEN 513	RF Integrated Circuit Design & Implementation	3
ECEN 523	Digital Signal Processing	3
ECEN 525	Mechatronic design	3
ECEN 514	Analog & Digital Filters & Communication Circuits	3
ECEN 515	FPGA & ASIC Design	3
ECEN 516	Introduction to Electronic Design Automation	3
ECEN 540	Selected Topics in Communications	3

University General Education Requirements	46
Engineering Education Requirements	57
Total ECE Required Credits	57
Total Number of ECE Technical Elective Credits	12
Total Number of Credits for B. Sc. in ECE	**172**

Computer Engineering Course Dependency



Electronics & Communications Engineering
Course Dependency



Computer Engineering - Sample 5-year Study Plan (Total 172 credit hours)

Year 1	Computer Engineering						
Semester 1				**Semester 2**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
MATH 111	Analytical Geometry and Calculus I		4	MENG 101	Engineering Mechanics	MATH 111	4
ENGR 101	Introduction to Engineering Disciplines		3	MATH 112	Calculus II	MATH 111	4
CSCE 101	Computer & Information Skills		3	ENGR 102	Engineering Design	ENGR101	3
CHEM 101	Chemical Principles		3	PHYS 101	Physics I	MATH 111	4
HUMA 101	Introduction to Logic and Critical Thinking		2	HUMA 102	Introduction to Ethics		1
ENGL 101	English I		3	ENGL 102	English II	ENGL101	3
	TOTAL CREDIT HOURS		**18**		***TOTAL CREDIT HOURS***		**19**

Year 2	Computer Engineering						
Semester 3				**Semester 4**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
PHYS 201	Physics II	PHYS101	4	ECEN 202	Fundamentals of Electrical Engineering	ECEN101	3
ECEN 101	Electric Circuits	PHYS101	3	ECEN 203	Fundamentals of Computer Engineering	CSCE 101	3
MATH 201	Intro. to Probability & Statistics	MATH111	3	MATH 302	Probability & Stat. For Engineers	MATH 201	3
MATH 203	Differential Equations	MATH112	4	CSCE 201	Introduction to Programming	CSCE 101	3
ENGL 201	Writing Skills	ENGL102	3	ENGR 103	Solid Modelling & Workshop	ENGR102	3
				ENGL 202	Communication & Presentation Skills	ENGL201	3
	TOTAL CREDIT HOURS		**17**		***TOTAL CREDIT HOURS***		**18**

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include 2 hours tutorial/lab per week.*

Year 3	Computer Engineering						
Semester 5				Semester 6			
CODE	COURSE TITLE	PREREQUISITE	C.H.	CODE	COURSE TITLE	PREREQUISITE	C.H.
IENG 301	Engineering Economics		3	IENG 302	Safety Engineering		3
ECEN 304	Fundamentals of Computer Systems Software	ECEN203	3	ECEN 302	Analysis & Design of Digital Circuits	ECEN301	3
MATH 301	Linear Algebra	MATH203	4	ECEN 305	Signals & Systems	MATH203	3
ECEN 301	Analysis & Design of Analog Circuits	ECEN202	3	ECEN 403	Electric Machines	ECEN202	3
ECEN 303	Introduction to Computer Systems	ECEN203	3	ECEN 307	Fundamentals of Data Structures & Algorithms	ECEN304	3
SSCI 101	Selected Topics in Egyptian & Arab Heritage		3	NSCI 102	Selected Topics in Natural Sciences		3
	TOTAL CREDIT HOURS		19		TOTAL CREDIT HOURS		18

Year 4	Computer Engineering						
Semester 7				Semester 8			
CODE	COURSE TITLE	PREREQUISITE	C.H.	CODE	COURSE TITLE	PREREQUISITE	C.H.
ECEN 401	Introduction to Computer Networks	ECEN 203	3	ECEN 406	Fundamentals of Control	ECEN 305	3
ECEN 402	Introduction to Computer Architecture	ECEN 303	3	ECEN 407	Operating Systems	ECEN 307	3
ECEN 306	Fundamentals of Communications	ECEN 305	3	ECEN 408	Advanced Computer Architecture	ECEN 402	3
ECEN 404	Introduction to Database Systems	ECEN307	3	ECEN 409	Microprocessor System Design	ECEN 402	3
XXXX XXX	Elective HUMA, SSCI or NSCI		3	SSCI 102	Selected Topics in World Cultures & Diversity		3
COMM 401	Internship and Service Learning		3				
	TOTAL CREDIT HOURS		18		TOTAL CREDIT HOURS		15

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include 2 hours tutorial/lab per week.*

Year 5	Computer Engineering						
Semester 9				**Semester 10**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
ECEN 501	Machine Intelligence	ECEN304	3	ECEN 502	Introduction to Computer Security	ECEN 401	3
ECEN XXX	Elective		3	ECEN XXX	Elective		3
ECEN XXX	Elective		3	ECEN XXX	Elective		3
HUMA 103	Selected Topics in Humanities & Arts		3	SSCI 103	Selected Topics in Social Sciences		3
ENGR 540	Graduation Project I	Senior	3	ENGR 541	Graduation Project II	ENGR 540	3
	TOTAL CREDIT HOURS		**15**		***TOTAL CREDIT HOURS***		**15**

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include 2 hours tutorial/lab per week.*

Electives			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
ECEN 521	Embedded System Engineering	ECEN 409	3
ECEN 522	Embedded Real-Time Systems	ECEN 409	3
ECEN 523	Digital Signal Processing	ECEN 305	3
ECEN 524	Image Processing & Bio-Image Informatics	ECEN 305	3
ECEN 525	Mechatronic Design	ECEN 521	3
ECEN 526	Wireless and Mobile Networks	ECEN 306	3
ECEN 527	Software Engineering	ECEN 304	3
ECEN 528	Numerical Methods & Math Precision	ECEN 307	3
ECEN 529	Compiler Construction	ECEN 307	3
ECEN 530	Introduction to Parallel Computing	ECEN 402	3
ECEN 550	Selected Topics in Computer Engineering		3

Electronics and Communications Engineering - Sample 5-year Study Plan (Total 172 credit hours)

Year 1	Electronics & Communications Engineering						
Semester 1				**Semester 2**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
MATH 111	Analytical Geometry and Calculus I		4	MENG 101	Engineering Mechanics	MATH 111	4
ENGR 101	Introduction to Engineering Disciplines		3	MATH 112	Calculus II	MATH 111	4
CSCE 101	Computer & Information Skills		3	ENGR 102	Engineering Design	ENGR101	3
CHEM 101	Chemical Principles		3	PHYS 101	Physics I	MATH 111	4
HUMA 101	Introduction to Logic and Critical Thinking		2	HUMA 102	Introduction to Ethics		1
ENGL 101	English I		3	ENGL 102	English II	ENGL101	3
	TOTAL CREDIT HOURS		**19**		***TOTAL CREDIT HOURS***		**18**

Year 2	Electronics & Communications Engineering						
Semester 3				**Semester 4**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
PHYS 201	Physics II	PHYS101	4	ECEN 202	Fundamentals of Electrical Engineering	ECEN101	3
ECEN 101	Electric Circuits	PHYS101	3	ECEN 203	Fundamentals of Computer Engineering	CSCE 101	3
MATH 201	Intro. to Probability & Statistics	MATH111	3	MATH 302	Probability & Stat. For Engineers	MATH201	3
MATH 203	Differential Equations	MATH112	4	CSCE 201	Introduction to Programming	CSCE 101	3
ENGL 201	Writing Skills	ENGL102	3	ENGR 201	Solid Modelling & Workshop	ENGR102	3
				ENGL 202	Communication & Presentation Skills	ENGL201	3
	TOTAL CREDIT HOURS		**17**		***TOTAL CREDIT HOURS***		**18**

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include 2 hours tutorial/lab per week.*

Year 3	Electronics & Communications Engineering						
Semester 5				**Semester 6**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
IENG 301	Engineering Economics		3	IENG 302	Safety Engineering		3
ECEN 305	Signals and Systems	MATH201	3	ECEN 310	Fundamentals of Electromagnetics	ECEN202	3
MATH 301	Linear Algebra	MATH202	4	ECEN 302	Analysis & Design of Digital Circuits	ECEN301	3
ECEN 301	Analysis & Design of Analog Circuits	ECEN202	3	ECEN 403	Electric Machines	ECEN202	3
ECEN 303	Introduction to Computer Systems	ECEN203	3	ECEN 308	Fundamentals of Semiconductor Devices	ECEN202	3
SSCI 101	Selected Topics in Egyptian & Arab Heritage		3	NSCI 102	Selected Topics in Natural Sciences		3
	TOTAL CREDIT HOURS		**19**		***TOTAL CREDIT HOURS***		**18**

Year 4	Electronics & Communications Engineering						
Semester 7				**Semester 8**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
ECEN 309	Digital Integrated Circuit Design	ECEN302	3	ECEN 409	Microprocessor System Design	ECEN303	3
ECEN 406	Fundamentals of Control	ECEN305	3	ECEN 412	Applied Electromagnetics	ECEN310	3
ECEN 306	Fundamentals of Communications	ECEN202,305	3	ECEN 413	Digital Communications	ECEN306	3
ECEN 411	Physical Sensors, Transducers & Instrum.	ECEN308	3	ECEN 414	Communication Networks	ECEN306	3
XXXX XXX	Elective HUMA, SSCI or NSCI		3	SSCI 102	Selected Topics in World Cultures & Diversity		3
COMM 401	Internship and Service Learning		3				
	TOTAL CREDIT HOURS		**18**		***TOTAL CREDIT HOURS***		**15**

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include 2 hours tutorial/lab per week.*

Year 5	Electronics & Communications Engineering						
Semester 9				**Semester 10**			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***	***CODE***	***COURSE TITLE***	***PREREQUISITE***	***C.H***
ECEN 503	Embedded & Discrete Control Systems	ECEN406,409	3	ECEN 504	Wireless Communications	ECEN 306	3
ECEN XXX	Elective		3	ECEN XXX	Elective		3
ECEN XXX	Elective		3	ECEN XXX	Elective		3
HUMA 103	Selected Topics in Humanities & Arts		3	SSCI 103	Selected Topics in Social Sciences		3
ENGR 540	Graduation Project I	Senior	3	ENGR 541	Graduation Project II	ENGR 540	3
	TOTAL CREDIT HOURS		**15**		***TOTAL CREDIT HOURS***		**15**

** MATH, PHYS, CSCE, CHEM, MENG and ECEN courses have an additional 90 min. tutorial per week.*

Electives			
CODE	***COURSE TITLE***	***PREREQUISITE***	***C.H.***
ECEN 402	Introduction to Computer Architecture	ECEN303	3
ECEN 510	Introduction to Optical Comm Systems	ECEN309	3
ECEN 511	Micro & Nano Systems Fabrication	ECEN309	3
ECEN 512	Analog Integrated Circuit Design	ECEN301	3
ECEN 513	RF Integrated Crct Design & Implementation	ECEN512	3
ECEN 523	Digital Signal Processing	ECEN305	3
ECEN 525	Mechatronic design	ECEN503	3
ECEN 514	Analog & Digital Filters & Comm Circuits	ECEN306	3
ECEN 515	FPGA & ASIC Design	ECEN309	3
ECEN 516	Introduction to Electronic Design Automation	ECEN308	3
ECEN 540	Selected Topics in Communications		3

COURSE DESCRIPTIONS

HUMANITIES, SOCIAL & NATURAL SCIENCES

HUMA 101: (2) Introduction to Logic, Critical Thinking The course is a study of the processes by which the intellect conceptualizes, applies, analyzes, synthesizes, and evaluates the information it gathers from observation, experience, reflection, reasoning and communication. The course also examines the elements of thought implicit in reasoning, such as assumptions; concepts, conclusions, implications, consequences and frame of reference. Problems of moral philosophy and moral judgments, such as cultural relativism and subjectivism are also addressed. Theoretical approaches for answering questions about right and wrong are considered.

HUMA 102: (1) Introduction to Ethics The emphasis of the course is on ethical issues and problems that arise in professional and business environments, such as integrity, civic responsibility, ethical conduct and misconduct, employee and corporate rights and responsibilities, and on issues concerning social and economic justice in a global economy.

HUMA 103: (3) Selected Topics in Humanities and Arts A course in any of the fields of Literature, Philosophy, Art, Music, or Sports.

NSCI 103: (3) Selected Topics in Natural Sciences A course in any of the fields of physics, chemistry, biology, geology, or environmental science.

SSCI 101 : (3) Selected Topics in Egyptian and Arab Heritage A course highlighting aspects of the extraordinarily rich Ancient Egyptian, Coptic and Islamic heritage of Egypt.

SSCI 102: (3) Selected Topics in World Cultures and Diversity This course exposes students to World Cultures both from a historical and a contemporary point of view. The course focuses on issues of globalization such as nationalism, struggle for identity and the conflicts caused by migration, racism, religious fundamentalism and terrorism. The course also emphasizes the positive aspects of multicultural societies, such as the sharing of resources and information and the increased understanding among the peoples of the world.

SSCI 103: (3) Selected Topics in Social Sciences A course in any of the fields of sociology, economics, education, history, anthropology, psychology, or geography.

NSCI *, SSCI *** or HUMA ***: (3) General Knowledge Elective** An additional course to be chosen from one of the above three General Knowledge categories: Natural Sciences, Social Sciences and Humanities & Arts.

MATHEMATICS AND BASIC SCIENCES

MATH 111: (4) Analytical Geometry & Calculus I
The course starts with a review of the basics of Analytical Geometry: the Cartesian coordinate system, distance, slope, equation and graph of a line and curve sketching. The calculus part covers functions, limits, derivatives, polynomials, rate of change, L'Hospital's Rule, higher derivatives, Mean Value Theorem, related rates, maximum and minimum, differentiation formulas, the differential and related applications.

MATH 112: (4) Calculus II
PR: MATH 111
Translation and rotation of axes, conic sections (properties of conic sections- parabola, ellipse, hyperbola), Cartesian, cylindrical and polar spherical coordinates.
Integral calculus: definite and indefinite integrals, integration methods and applications of integration, integration by substitution and by parts, Integration by trigonometric substitution and partial fractions; arc length; improper integrals; Simpson's and Trapezoidal Rules for numerical integration. Functions of several variables and multiple integrals.

MATH 201: (3) Introduction to Probability & Statistics
PR: MATH 111
This course takes a non-calculus approach to probability and statistics; topics include permutations and combinations, independence, random variables, events, measures of location and variability, joint and conditional probability. The course also introduces descriptive and inferential statistics, including graphical methods and data description.

MATH 203: (4) Differential Equations
PR: MATH 112
Separable differential equations, first order linear differential equations, homogeneous second order linear differential equations with constant coefficients, series solution, Newton's method, Taylor's Theorem. First-Order, Second-Order and Higher-Order Linear Differential Equations, partial differential equations, and Laplace transforms.

MATH 302: (4) Probability & Statistics for Engineers
PR: MATH 201
The probability part of the course covers conditional independence, discrete and continuous distribution functions, and conditional distributions, and the Central Limit theorem. The statistics course covers descriptive and inferential statistics, including graphing data, distributions, estimation and hypotheses testing and correlation analysis.

MATH 301: (4) Linear Algebra
PR: MATH 203
Matrices and Gaussian elimination, Vector Spaces, Vector calculus, Orthogonality, Determinants, Eigenvalues and Eigenvectors, Positive definite matrices, Computations with matrices, Linear programming and Game theory.

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include two hours of tutorial/labs per week.*

PHYS 101: (4) Physics I
PR: MATH 111
Measurements: Standards of length, mass, and time, dimensional analysis, the International system of units SI, conversion of units. Mechanics: Newton's laws and applications, potential and kinetic energy, satellite motion and Kepler's laws. Electrostatics: electric charge and Coulomb's law: insulators and conductors, electrostatic field, Gauss' law, potential, potential energy, dielectrics and capacitances, displacement vector, energy stored in the electrostatic field. Electrodynamics: electromotive force, voltage, electric current, resistance, Ohm's law, electric power, direct current circuits, Kirchhoff's laws, multi loop circuits. Magnetism: magnets, magnetic field, force on a current-carrying conductor, Ampere's law and applications, induction, Faraday's law, Lenz's law, inductors, energy stored in a magnetic field, mutual induction, magnetism of matter. Relevant lab experiments will be conducted.

PHYS 201: (4) Physics II

Physics II PR: PHYS 101 and MATH 111
Optics: Interference, Diffraction, Polarization, electric and magnetic properties of light. Fluid Dynamics: hydrostatic pressure, Pascal's principle, Archimedes' principle, Dynamics of ideal fluids: continuity equation, Bernoulli's equation, viscosity. Thermodynamics: The nature of heat, the laws of thermodynamics, temperature, thermal expansion, absorption of heat by solids and liquids, heat transfer mechanisms, kinetic theory of gases, ideal gases, distribution of molecular speed, molar specific heat, degrees of freedom, entropy, reversible and irreversible processes. Solid state physics: conductors, insulators and semiconductors. Modern Physics: atoms and molecules, nuclear structure, nuclear fission and fusion and the quantum. Relevant lab experiments will be conducted.

CHEM 101: (3) Chemical Principles Mass and Energy balance, dynamic equilibrium in physical and chemical processes, concepts of rate processes, energy and mass transport, and kinetics of chemical reactions, combustion processes of fuels Electrochemistry and corrosion. Applications of these concepts to areas of current technological importance: biotechnology, production of chemicals, chemical pollution, materials processing, and water treatment and purification. Relevant lab experiments will be conducted.

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include two hours of tutorial/labs per week.*

ENGINEERING COURSES

ENGR 101: (3) Introduction to Engineering Disciplines The course gives freshmen an overview of the main engineering disciplines thus helping them make the right choice regarding their future careers. Case studies in engineering are used to illustrate engineering and scientific principles. The students are also familiarized with some of the important engineering tools for problem solving such as MATLAB.

ENGR 102: (3) Engineering Design
PR: ENGR 101
An introduction to the methods, tools, and processes related to engineering design. The course gives the student the ability to communicate by means of engineering drawing, including Orthographic representation of shapes, to develop three-dimensional imagination of forms and methods of presenting them in the plane, acquiring the skill of dealing with complex figures and study their geometrical properties. The students are also familiarized with some of the important engineering tools for graphical modeling including Computer-Aided Drawing (CAD) and Computer-Aided Manufacturing (CAM). Group projects and case studies in engineering are used to illustrate engineering and scientific principles.

ECEN 101: (3) Electric Circuits
PR: PHYS 101
Basic electrical concepts and network theorems, circuit laws, resistance, capacitance, inductance; response of RC, RL and RLC circuits to initial conditions and constant forcing functions; AC steady-state analysis and AC power. Computer applications (using SPICE or similar tools).

MENG 101: (3) Engineering Mechanics (Statics & Dynamics)
PR: MATH 111
Space vectors, resultant of forces, moment, equations of equilibrium of a rigid body, types of supports, equilibrium of systems, mass center, moment of inertia, displacement, velocity and acceleration of a particle, trajectory equations, use of Cartesian coordinates to describe particle motion, projectiles, polar axes, relative motion, Newton's law of motion, resistive media, simple harmonic motion of a particle, motion on circular path, work and Kinetic energy, conservative forces, conservation of energy, impulse and momentum, eccentric impact of two particles.

ENGR 201: (3) Solid Modeling & Workshop
PR: ENGR 102
The course covers the foundations of mechanical design, descriptive and solid geometry, including projections and intersections, basic dimensioning, sections, fasteners, materials, and forming processes. In the workshop the students learn how to use basic machine shop equipment and tools, how to operate them safely, and how to control these machines numerically and digitally.

IENG 302: (3) Safety Engineering
The focus of the course is on a system engineering approach to safety, causes of accidents, accident analysis and control, techniques used in safety analysis, safety management and organization, risk management, training, human behavioral approach in safety.

**All MATH, PHYS, CSCE, CHEM, MENG and ECEN courses include two hours of tutorial/labs per week.*

IENG 301: (3) Engineering Economics Introduction to the concepts of determining the economic feasibility of engineering undertakings, especially the time value of money, interest rates, depreciation, replacement, economic life, present value, rate of return, payback period. Other topics will include financing, supply and demand, private and social cost estimations, secondary and intangible benefits and costs, benefit-cost models, economic risk analysis and economic optimization.

ECEN 202: (3) Fundamentals of Electrical Engineering
Co-requisite: MATH 203 and ECEN 101
This course covers topics that are fundamental to a wide variety of electrical engineering systems. Topics include circuit analysis techniques, passive and active components modeling, operational amplifiers, energy storage elements, power analysis, time-response of first- and second-order systems, sinusoidal steady-state response, frequency domain analysis, and filters. Other topics may include: diodes and transistors, basic noise analysis, transformers, pole-zero plotting and analysis in the complex plane. Relevant lab experiments are conducted.

ECEN 203: (3) Fundamentals of Computer Engineering
PR: CSCE101
This course introduces basic issues in design and verification of modern digital systems. Topics include: Boolean algebra, digital number systems and computer arithmetic, combinational and sequential logic design and optimization, register-transfer design, basic processor organization and instruction set issues, assembly language programming and debugging, and a hardware description language. Emphasis is on the levels of abstraction and hardware description language methods that allow designers to cope with hugely complex systems, and on connections to practical hardware implementation problems. Students are introduced to computer-aided digital design software.

ECEN 310: (3) Fundamentals of Electromagnetics
PR: ECEN 202
This course introduces electromagnetic principles and describes how they are applied in engineering devices and systems. Topics include: vector calculus, Maxwell's equations in integral and differential forms with associated boundary conditions, quasi static electric fields in free space and in materials, superposition for known charge sources, conduction and polarization, resistance and capacitance, charge relaxation, analytic and numerical methods for electric field boundary value problems, quasi static magnetic fields in free space and in materials, superposition for known current sources, magnetization, inductance, magnetic diffusion, and analytic and numerical methods for magnetic field boundary value problems.

ECEN 301: (3) Analysis and Design of Analog Circuits
PR: ECEN 202
The course introduces the student to the fundamentals of the analysis and design of basic analog circuits. Topics include: operational amplifier design, basic amplifier feedback theory, frequency stability and compensation, dc bias calculations and circuits, MOSFET and BJT large- and small-signal device models, small-signal gain and frequency response characteristics of amplifiers, large-signal characteristics and non idealities. In the hardware laboratory the student will gain experience designing, building, and characterizing analog circuits. The students will also learn how to use the SPICE circuit simulation program to compare actual and simulated performance.

ECEN 302: (3) Analysis and Design of Digital Circuits
PR: ECEN 202 and ECEN 203
Overview of digital logic design. Implementation technologies, timing in combinational and sequential circuits, basic arithmetic units, EDA tools, introduction to simulation and synthesis using VHDL.

ECEN 303: (3) Introduction to Computer Systems
PR: ECEN 203
This course provides a programmer's view of how computer systems execute programs, store information, and communicate. It enables students to become more effective programmers, especially in dealing with issues of performance, portability and robustness. It also serves as a foundation for courses on compilers, networks, operating systems, and computer architecture, where a deeper understanding of systems-level issues is required. Topics covered include: machine-level code and its generation by optimizing compilers, performance evaluation and optimization, computer arithmetic, memory organization and management, networking technology and protocols, and supporting concurrent computation.

ECEN 304: (3) Fundamentals of Computer System Software
PR: ECEN 203
The course explores on a wide variety of languages, with an emphasis on object oriented languages, such as C++ and Java, and scripting languages such as Perl, Python, and Ruby. The course focusses on fundamental concepts, and on the differences between languages, the reasons for those differences, and the implications those differences have for language implementation.

ECEN 305: (3) Signals & Systems
PR: MATH 203
The objective of this course is to provide students with an understanding of the relationships between mathematical tools and properties of real signals and systems. Continuous and discrete-time signals and systems are treated in a unified manner through the concept of sampling. The course covers the basic concepts and tools needed to perform time and frequency domain transform analyses of signals and linear time-invariant systems, including: impulse and step response and convolution; Fourier transforms and filtering; Laplace transforms, feedback and stability; and a brief introduction to z-transforms in the context of digital filtering.

ECEN 308: (3) Fundamentals of Semiconductor Devices
PR: ECEN 202
An introduction to the operation and fabrication of the most important semiconductor devices used in integrated circuit technology together with device design and layout. At the end of the course students will have a basic understanding of pn diodes, bipolar transistors, and MOSFETs, light emitting and light detecting devices such as photodiodes, LEDs and solar cells. Students will also receive an introduction to the fundamental concepts of semiconductor physics such as doping, electron and hole transport, and band diagrams. In the laboratory they learn how to lay out both bipolar and MOS devices and design small (2-3 transistor) circuits. Students experimentally evaluate the operation of amplifier and gate circuits fabricated with discrete devices. This course gives the student the understanding of the operation and fabrication of the devices necessary for high-performance analog and digital circuit design.

ECEN 309: (3) Digital Integrated Circuit Design
PR: ECEN 302
This course is intended to provide the student with IC design experience. The emphasis is on the IC design process as a whole. The aim is to reach an optimal design through optimization of a number of variables ranging from the choice of architecture to the details of the IC layout. Typical performance criteria of the design are: throughput, power, signal-to-noise ratio, clock frequency, and gain-bandwidth. Typical constraints will be: die size and minimum feature size.

ECEN 401: (3) Introduction to Computer Networks
PR: ECEN 203
This course introduces the fundamental concepts of data networks. Underlying engineering principles of computer networks and integrated digital networks are discussed. Topics include: data networks overview; OSI layers; data link protocol; flow control, congestion control, routing; local area networks (Ethernet, Token Ring and FDDI); transport layer; Introduction to high-speed networks and performance evaluation techniques.

ECEN 307: (3) Fundamentals of Data Structures & Algorithms
PR: ECEN 304
Fundamental concepts of data structures and algorithms for representing and processing information; including the use of linked lists, stacks, queues, directed graphs and trees. Analysis of algorithms, sorting, searching and hashing techniques.

ECEN 402: (3) Introduction to Computer Architecture
PR: ECEN 303
This course introduces the basic hardware structure of a programmable computer and the basic laws underlying performance evaluation. The student learns how to design the control and data path hardware for a processor, how to make machine instructions execute simultaneously through pipelining and simple superscalar execution, and how to design fast memory and storage systems. The principles presented in lecture are reinforced in the laboratory through design and simulation of a register transfer (RT) implementations in verilog.

ECEN 406: (3) Fundamentals of Control
PR: ECEN 305
The course is an introduction to the fundamental principles and methodologies of classical feedback control and its applications. Topics include analytical, graphical and computer-aided (MATLAB) techniques for analyzing and designing automatic control systems; analysis of performance, stability criteria, realizability, and speed of response; compensating methods in the frequency domain, root-locus and frequency response design, and pole-zero synthesis techniques; robust controller design; systems with delay and computer control systems; transfer function and state space modeling of linear systems, nonlinearities in control systems; and control engineering software (MATLAB).

ECEN 306: (3) Fundamentals of Communications
PR: ECEN 202 and ECEN 305
Fundamental analog and digital communications concepts are presented together with supporting theoretical foundations and practical applications. Signals and bandwidth concepts, spectra, basics of electronics, information and coding, modulation, multiplexing, transmission systems, transmission media, analog versus digital communications, computer networks, and switching techniques.

ECEN 403: (3) Electric Machines
PR: ECEN 202
This course covers polyphase systems, magnetic circuit concepts, principles of electromechanical energy conversion, introduction to transformers, dc machines, induction machines, synchronous machines, stepper motors, electric drives, rectifiers and inverters.

ECEN 404: (3) Introduction to Databases
PR: ECEN 307
Data models and database design. Modeling the real world: structures, constraints, and operations. The entity relationship to data modeling (including network hierarchical and object-oriented), emphasis on the relational model. Use of existing database systems for the implementation of information systems.

ECEN 409: (3) Microprocessor System Design
PR: ECEN 303
Structure and timing of typical microprocessors. Sample microprocessor families. Memories, UARTS, timer/counters, serial devices and related devices. MUX and related control structures for building systems. Interrupt programming. Hardware/software design tradeoffs.

ECEN 414: (3) Communications Networks
PR: ECEN 306
Basic techniques for modeling and analyzing communication networks. Topics include overview telephone and cellular, and computer networks, layered network architectures and models, protocol specification and correctness, queuing models, loss networks, multi-class queues and scheduling, graph-based and flow-based routing, and congestion control.

ECEN 413: (3) Digital Communications
PR: ECEN 306
The course introduces the fundamentals of digital signaling, information theory and coding, digital transmission and reception. Topics include sampling and time-division multiplexing, baseband digital signals and systems, pulse code modulation, error control, digital modulation systems, information measure and source encoding, and introduction to spread spectrum communications.

ECEN 412: (3) Applied Electromagnetics
PR: ECEN 310
This course builds upon the electric and magnetic field foundations established in the fundamentals of electromagnetics course to describe devices and phenomena in which electromagnetics waves are a central issue. Topics include: review of Maxwell's equations, propagation of uniform plane waves in lossless and lossy media, energy conservation as described by the Poynting Theorem, reflection and transmission with normal and oblique incidence, sinusoidal steady state and transients on two-conductor transmission lines, modal descriptions of waveguides, radiation and antennas.

ECEN 411: (3) Physical Sensors, Transducers and Instrumentation
PR: ECEN 310 and ECEN 308
The course explores many types of responses to physical stimuli, as well as the instrumentation, electronic detection, signal conversion and signal processing techniques used to capture the physical event electronically. This requires knowledge of the diversity of physical phenomena, and the materials and devices that can be used to convert the various forms of physical energy into electronic signals.

ECEN 510: (3) Introduction to Optical Communications Systems
PR: ECEN 309
The course objective is to provide a basic understanding of present optical communication systems as well as future engineering challenges. The course covers the basic concepts of data modulation in optical fiber channels, channel multiplexing, wavelength division multiplexing, and fiber optics. The course also addresses the basic function principles of optical fibers, light emitting diodes, lasers, optical amplifiers, and optical receivers.

ECEN 511: (3) Micro and Nano Systems Fabrication
PR: ECEN 309
This course introduces students to the process flow and design methodology for integrated systems fabrication. The course highlights the basic unit processes of micro and nano systems fabrication: deposition, patterning, and etching. Students are exposed to examples from: Semiconductor device fabrication; MicroElectroMechanical systems (MEMS) fabrication; Magnetic device fabrication, and optical device fabrication. Labs allow the students to design, fabricate and test an integrated device.

ECEN 512: (3) Analog Integrated Circuit Design
PR: ECEN 301
The Course teaches methods used in the design and analysis of analog integrated circuits, illustrating how to approach design problems in general, and exposing the students to a broad cross-section of analog circuit topologies. The course focuses on learning design through carrying out design projects. Design and implementation details of wide-band amplifiers, operational amplifiers, continuous-time filters, phase lock loops and data converters are covered. The course focuses mainly on analog CMOS, but some aspects of BJT design will be discussed.

ECEN 513: (3) Radio Frequency Integrated Circuit Design and Implementation
PR: ECEN 512
The course covers the design and analysis of radio frequency integrated circuits at the transistor level using CMOS and bipolar technologies. It focuses on system-level trade-offs in transceiver design, practical RF circuit techniques, and physical understanding of device parasitics. Models for active devices, passive components and interconnect parasitics are examined. The course also covers concepts in wireless system design and their impact on design trade-offs in different transceiver architectures. RF transistor models, passive matching networks, noise analysis and low-noise amplifier design are studied. The effects of nonlinearity are treated along with mixer design techniques and practical bias circuits. The importance of phase noise and VCO design will be considered.

ECEN 521: (3) Embedded Systems Engineering
PR: ECEN 203
Topics covered include embedded computing platforms (hardware, microcontroller instruction sets, software), interacting with the external world (analog I/O, serial ports, control), system-level engineering (design cycle, architectural patterns), real time operation (timers, interrupts, concurrency), constraints and optimization (economics, power, performance) and a survey of techniques important for building systems that work in the real world (debug, test, robust design, dependability). Hands-on experience with a 16-bit microcontroller module reinforces core skills.

ECEN 522: (3) Embedded Real-Time Systems
PR: ECEN 409
This practical hands-on course introduces the various building blocks and principles behind embedded real-time systems. The course covers the integrated hardware and software aspects of embedded processor architectures, along with topics such as real-time, resource/device and memory management, interaction with devices (buses, memory architectures, memory management, device drivers), concurrency (software and hardware interrupts, timers), real-time principles (multi-tasking, scheduling, synchronization), implementation trade-offs, profiling and code optimization (for performance and memory), embedded software (exception handling, loading, mode-switching, programming embedded systems). Through a series of laboratory exercises with state-of-the art embedded processors and industry-strength development tools, students will acquire skills in the design/implementation/debugging of core embedded real-time functionality.

ECEN 408: (3) Advanced Computer Architecture
PR: ECEN 402
This course examines computer design trade-offs. The topics covered include: advanced processor designs, such as superscalar and out-of-order execution, advanced memory systems, such as non-blocking caches, and multiporting/banking and alternative virtual memory implementations, I/O systems, interconnects, introduction to multiprocessor architectures, performance and cost metrics, and benchmarking.

ECEN 407: (3) Operating Systems
PR: ECEN 307
This course provides an overview of fundamental operating system principles, complemented with discussions of concrete modern systems to help you understand how these principles are applied in real OSs . Topics covered include an overview of the components of an operating system, mutual exclusion and synchronization, implementation of processes, scheduling algorithms, memory management and file systems. The course has a strong project component intended to provide essential experience in designing and implementing complex systems and working as part of a team.

ECEN 502: (3) Introduction to Computer Security
PR: ECEN 401
This course is an introduction to techniques for defending against hostile adversaries in modern computer systems and computer
networks. Topics covered include operating system security; network security, cryptography and cryptographic protocols, firewalls, network denial-of-service attacks and defenses; user authentication technologies; security for network servers; web security; and security for mobile code technologies, such as Java and Javascript.

ECEN 504: (3) Wireless Communication
PR: ECEN 306
In this course wireless communication channels are introduced, and their peculiarities such as fading and co-channel interference are emphasized. Solutions to combat the problems are described, covering equalization and detection, coding and diversity ideas. Examples will be chosen from existing wireless standards (e.g., W-CDMA). The course also covers basic communication theory.

ECEN 503: (3) Embedded and Discrete Control Systems
PR: ECEN 406,409
The course introduces principles for design of embedded controllers and emphasizes the tools for modeling and simulating dynamic systems and designing the real-time control software for embedded computers. Relevant theory and background from real-time systems and control engineering are covered, including event-based and clock-based sampling, switching control, pulse-width modulation, PID design, state-variable feedback, state estimation, and methods for setpoint control and trajectory tracking. Basic computing, sensor, and actuator technologies are also considered.

ECEN 523: (3) Digital Signal Processing
PR: ECEN 305
The course addresses the mathematics, implementation, design and application of the digital signal processing algorithms used in areas such as multimedia telecommunications and speech and image processing. Topics include discrete-time signals and systems, discrete-time Fourier transforms, Z- transforms and fast Fourier transform, digital filter design and implementation, and multi-rate signal processing. The course also includes introductory discussions of 2-dimensional signal processing, linear prediction, adaptive filtering, and selected application areas. Lectures are supplemented with exercises using MATLAB.

ECEN 524: (3) Image Processing and Bio-image Informatics
PR: ECEN 305
This course gives an overview of biological and biomedical imaging modalities, such as fluorescent microscopy, electron microscopy, magnetic resonance imaging, ultrasound and others. The focus is on automating and solving the fundamental tasks required for the interpretation of these images, including deconvolution, registration, segmentation, pattern recognition, and modeling, as well as tools needed to solve those tasks (such as Fourier and wavelet methods). The discussion of these topics will draw on many fields including statistics, signal processing, and machine learning.

ECEN 525: (3) Mechatronic Design
PR: ECEN 521 or ECEN 503
Mechatronics is the synergistic integration of mechanism, electronics, and computer control to achieve a functional system. The course emphasizes system integration in which small teams of students configure, design and implement a succession of mechatronic subsystems, leading to a main project. Lecture will complement the laboratory experience with the operational principles, and integrated design issues associated with mechanism, electronics and control components. Topics include: mechanisms, actuators, motor drives, sensors and electronic interfaces, microcontroller hardware and programming and basic controllers.

ECEN 527: (3) Software Engineering
PR: ECEN 304
The course covers concepts of software processes, implantation techniques, and project management. It focuses on several aspects of the software lifecycle that have significant influence on the overall quality of the software system including techniques and approaches to requirement engineering, software architecture, software design, quantitative measurement and assessment of the system during implementation, testing, and maintenance, and the role of verification and validation in assuring software quality.

ECEN 501: (3) Machine Intelligence
PR: ECEN 304
The course covers techniques and applications of artificial intelligence and machine learning; representation retrieving and application of knowledge for problem solving. Topics typically include hypothesis exploration, theorem proving, vision, Bayesian learning, decision trees, genetic algorithms, neural networks.

ECEN 514: (3) Analog and Digital Filters and Communications Circuits
PR: ECEN 306
Characterization, properties, and analysis of analog filters. Butterworth, Chebyshev, and elliptic approximations. Introduction to the realization of LC one- and two-port circuits; Darlington's method. Active elements such as gyrators and generalized impedance converters, and their representation by singular elements. Design of high-performance, low-sensitivity active filters. The course includes a project in which a complete analog filter is designed. Recursive and nonrecursive digital filters, decimation and interpolation, A/D and D/A conversion as digital filtering problems. Implementation of nonrecursive filters via FFT, quantization problems, e.g., companding and limit.

ECEN 528: (3) Numerical Methods and Mathematical Precision of Floating Numbers *PR: ECEN 307*
Introduction to numerical methods; numerical differentiation, numerical integration, solution of ordinary and partial differential equations. Consequences of limited precision computing. Students write programs in C++, C, or Matlab using methods presented in class.

ECEN 529: (3) Compiler Construction
PR: ECEN 307
Overview of compilers and context-free languages, top-down parsing, LL(1) parser construction, translation grammars, implementation of lexical analyzer, parser and translator, compiler optimization, error handling, and recovery.

ECEN 515: (3) FPGA and ASIC Design
PR: ECEN 309
. Overview of Computer Aided Design tool flow for ASIC and FPGA Design. Synthesis from hardware description languages and creation of finite state machines. Differences between FPGA and ASIC design flows. Exploration of concepts in several projects.

ECEN 516: (3) Introduction to Electronic Design Automation (EDA and CAD)
PR: ECEN 308
Basic concepts in VLSI CAD with emphasis on physical design, fundamental algorithms for CAD problems, development of CAD tools.

ECEN 530: (3) Introduction to Parallel Computing
PR: ECEN 304, ECEN 402
Introduction to parallel computing for scientists and engineers. Shared memory parallel architectures and programming, distributed memory, message-passing data-parallel architectures, and programming.

ECEN 540: (3) Selected Topics in Communications.
This course is tailored to introduce students to the latest advances in the various fields in communications, and/or to focus on a specific area of particular interest to the discipline.

ECEN 550: (3) Selected Topics in Computer Engineering.
This course is tailored to introduce students to the latest advances in the various fields in computer engineering, and/or to focus on a specific area of particular interest to the discipline.

ENGR 540: (3) Graduation Project I
PR: Senior standing
A capstone project. Topics are selected by students according to their areas of interest and their advisor's approval. Projects address solutions to open-ended applications using an integrated engineering approach.

ENGR 541: (3) Graduation Project II
PR: ENGR 540
The continuation and completion or the capstone project.

OTHER COURSES

CSCE 101: (3) Computer & Information Skills
The goal of the course is to help the student develop the basic research and information technology skills needed to succeed in their academic and later professional careers. These skills include defining information needs, efficient use of web resources, managing data, basics of data bases, effective research methodologies, evaluation of research results and communicating these results in electronic form –via programs such as, but not limited to, WORD, POWERPOINT, EXCEL and ACCESS.

CSCE 201: (3) Introduction to Programming
Introduction to the process of program design and analysis using the C ++ and the Java programming languages. The course provides basic understanding of programming concepts; constructs, data types, looping, nesting, functions, arrays, objects and classes. The topics also include good programming practices, modularity, reusability and ease on maintenance.

COMM 401: (3) Internship & Service Learning
Student internships provide on-the-job training opportunities to students that help them gain experience in their fields, develop an interest in a particular career, and create a network of contacts. Service-learning enriches learning by engaging students in meaningful service to their communities. Students apply academic skills to solving real-world problems and linking their learning with genuine needs. They also learn to apply critical thinking and problem-solving skills to global concerns such as hunger, pollution, and diversity. Students spend a full month of non-lecture time on their internship/service learning activity and submit a report at the end.

ENGL 101: (3) English I
The goal of the course is to develop college skills of reading, writing and critical thinking, to know how to select a topic, explore and organize ideas, use vocabulary efficiently, use correct grammatical structures and write an essay ranging between three to five paragraphs.

ENGL 102:(3) English II
PR: ENGL 101
The goals of the course include: Locating materials through observation, analysis and critical reading, developing a focused thesis statement, developing well structured paragraphs composed of an introduction, a body and a conclusion. Use of summarizing and paraphrasing skills.

ENGL 201: (3) Writing Skills
PR: ENGL 102
The goals of the course include: Locating materials for a research topic, using library and internet resources, summarizing articles and books, using quotation and source citation for professional papers, using inductive and deductive reasoning, developing the skills of scientific argumentation, persuasion, evaluation and criticism needed for a research paper.

ENGL 202: (3) Communication & Presentation Skills
PR: ENGL 201
This course helps students learn and practice the skills of interpersonal and professional communication. Psychological, social, cultural and linguistics aspects of communication are considered. Attention is given to human perceptions, interpersonal dynamics, patterns of inference, the arts of listening and convincing, as well as to the value of verbal and visual symbols. The course also helps students improve their skills in oratory, argumentation and public presentation.

COMPUTER ENGINEERING,

ELECTRONICS AND COMMUNICATION ENGINEERING

FULL-TIME FACULTY

Name	Rank	University of Ph.D.
Mahmoud Allam	Professor, Director of CE program	University of Wisconsin - Milwaukee, USA
Rafik Guindi	Professor, Director of ECE program	University of Waterloo, Canada
Nashwa Abdelbaki	Associate Professor	University of Ulm, Germany
Samhaa Elbeltagy	Professor	University of Southampton, UK
Ahmed Radwan	Associate Professor	Cairo University
Ahmed Madian	Associate Professor	Cairo University
Sameh Elansary	Associate Professor	KTH University, Sweden
Ahmed Shosha	Assistant Professor	University College Dublin, Ireland

PART-TIME FACULTY

Name	Institution
Marianne Azer	Cairo University
Alaa Hamdy	Cairo University
Elsayed Tag Eldin	Cairo University
Ahmed Morgan	Cairo University
Seif Eldawlatly	Ain Shams University
Michael Gad	Ain Shams University

PROGRAM COORDINATOR

Ms. Jilan Hassan

STUDENTS IN THE PROGRAM

Registered Students

Semester	Fall 11	Spring 12	Fall 12	Spring 13	Fall 13	Spring 14	Fall 14	Spring15
Total	25	25	31	31	31	31	49	44

*First cohort graduated in Spring 2014.

Educational Laboratories

i. **Electronics and communication labs**

ii. **Computer Labs**

iii. **Physics Laboratories:**

Physics Lab 1: Motion, Electricity, and Magnetism.

Physics Lab 2: Optics and Thermodynamics.

iv. **Chemistry laboratory**.

v. **Workshop**