

2014-2015 SHORT SIGNATURE SHEET



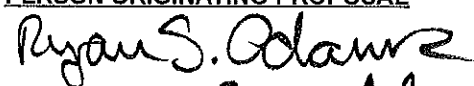
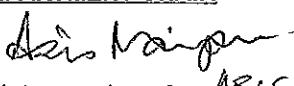

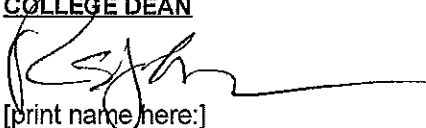
UNC CHARLOTTE

Date: 22 January 2015

Subject: Catalog Change for Computer Engineering

Originating Department: ECE

TYPE OF PROPOSAL: UNDERGRADUATE X GRADUATE _____ UNDERGRADUATE & GRADUATE _____
(Separate proposals sent to UCCC and Grad. Council)

DATE RECEIVED	DATE FORWARDED	COMMENTS: APPROVED, APPROVED WITH REVISIONS, ETC.	SIGNATURES
	20 Mar 2015		<u>PERSON ORIGINATING PROPOSAL</u>  [print name here:] Ryan Adams
	3/25/2015	Approved	<u>DEPARTMENT CHAIR</u>  [print name here:] ASIS NASIPURI
		Approved	<u>COLLEGE CURRICULUM COMMITTEE CHAIR</u>  [print name here:] Mehdi Miri
	4/23/15	Approved	<u>COLLEGE DEAN</u>  [print name here:]
		Approved	<u>GENERAL EDUCATION</u> (if applicable; for General Education courses only) [print name here:]
		Approved	<u>HONORS COLLEGE</u> (if applicable; for Honors courses & programs) [print name here:]
		Approved	<u>UNDERGRADUATE COURSE & CURRICULUM COMMITTEE CHAIR</u> (for undergraduate courses only)
		Approved	<u>GRADUATE COUNCIL CHAIR</u> (for graduate courses only)
			<u>FACULTY GOVERNANCE ASSISTANT</u> (received and processed in Academic Affairs)



UNC CHARLOTTE

SHORT FORM COURSE AND CURRICULUM PROPOSAL

*To: Dr. Mehdi Miri

From: Dr. Ryan Adams

Date: 22 January 2015

Re: Catalog Change for Computer Engineering

SUMMARY: This proposal intends to make several changes to the computer engineering program to align better with our educational objectives and desired student outcomes. These changes include the following:

- 1) Elimination of a 3 credit hour writing intensive course from the curriculum. This aligns with the university's "writing across the curriculum" initiative.
- 2) Elimination of ECGR 2255 from the curriculum and addition of ECGR 3157 to the curriculum. These two courses have sufficient overlap that it is no longer necessary to offer two different courses, one for electrical engineering students and the other for computer engineering students.
- 3) Combination of the content in ECGR 3181 into ECGR 2181 and elimination of ECGR 3181 from the curriculum.
- 4) Addition of ECGR 2252 to the curriculum – this will add a design course to the sophomore year for computer engineering students.
- 5) Addition of a new course ECGR 3101: Embedded Systems. This course has historically been offered in the Senior year in the form of ECGR 4101 Embedded Systems. However, we have found that students that take senior design without first completing this course perform more poorly than those that do. So, we would like to move embedded systems from the senior year to the junior year and make it a prerequisite for senior design for computer engineering students.
- 6) Creation of new courses ECGR 4232 and 4242 (Computer Engineering Senior Design I and II).
- 7) Elimination of the advanced problem solving elective and replacement with MATH 2164
- 8) Elimination of math/science restricted elective and replacement with MATH 2241
- 9) Increase the number of depth electives to 9 credits.

- 10) Consolidate the depth elective areas to a single area that encompasses all courses previously in the three depth areas.
- 11) Add three technical electives, two of which are chosen from 4000 level or above ECGR courses, and the third course chosen from 3000 level or above ECGR, MATH, PHYS, or ITCS courses.
- 12) Eliminate the Grade Requirements section since this requirement is superseded by the college of engineering's policies for the freshman year.

FOR CONSULTATION WITH OTHER DEPARTMENTS:

1. Does the proposed change affect other departments (including additions and/or changes to degree requirements or prerequisites offered in other departments)?
 Yes No
2. If Yes, please list the other departments affected by the proposed change:

Mathematics

3. Have you consulted with each department listed in item 2 regarding the proposed change?
 Yes No

Result(s) of Consultation(s) (please attach documentation):

The mathematics department has confirmed that they can support the addition of MATH 2164 and MATH 2241 as required courses in the curriculum. The mathematics department has also confirmed that they can support the replacement of STAT 2122 with STAT 3128. Please see attached email confirmation.

The economics department has confirmed that they will support allowing our students to choose between ECON 2101 and 2102 (please see attached email confirmation).

4. For a new course or for major modification of an existing course, include Consultation on Library Holdings.
5. For proposals involving Honors courses or programs, include written consultation with the Honors Council.

RESOURCES:

1. For a new course or revisions to an existing course, check all the statements that apply:
 This course will be cross listed with another course.
 There are prerequisites for this course.
 There are co-requisites for this course.
 This course is repeatable for credit.
 This course will affect the number of credits hours for its program.
 This proposal results in the deletion of an existing course(s) from the degree program and/or catalog.
 This proposal will alter an agreement with a North Carolina community college.

For all items checked above, applicable statements and content must be reflected in the proposed catalog copy.

2. Indicate the additional resources required, if any, to implement and maintain the proposed change.

None

CREDIT HOUR (Mandatory if new and/or revised course in proposal):

Review statement and check box once completed.

- The appropriate faculty committee has reviewed the course outline/syllabus and has determined that the assignments are sufficient to meet the University definition of a credit hour.

PROPOSED CATALOG COPY: For existing courses copy and paste the current catalog copy and use the Microsoft Word "track changes" feature (or use red text with "strikethrough" formatting for text to be deleted, and adding blue text with "underline" formatting for text to be added). For new courses, draft comprehensive catalog copy.

BACHELOR OF SCIENCE IN COMPUTER Engineering (B.S.Cp.E.)

A Major in Computer Engineering leading to the B.S.Cp.E. degree consists of ~~425~~ 127 credit hours.

Degree Requirements

General Education Courses (2124 hours)

ECON 2101 Principles of Economics – Macro (3) or ECON 2102 Principles of Economics – Micro (3)
LBST 110x The Arts and Society (3)
LBST 2101 Western Cultural and Historical Awareness (3)
LBST 2102 Global and Intercultural Connections (3)
LBST 221x Ethical Issues and Cultural Critique (3)
UWRT 1101 Writing and Inquiry in Academic Contexts I (3)
UWRT 1102 Writing and Inquiry in Academic Contexts II (3)
~~XXXX 2XXX Writing Intensive Course (3)~~

Pre-Major Courses (18 hours)

CHEM 1251 General Chemistry I (3)
CHEM 1251L General Chemistry I Lab (1)
ENGR 1201 Introduction to Engineering Practices and Principles I (2)
ENGR 1202 Introduction to Engineering Practices and Principles II (2)
MATH 1241 Calculus I (3)
MATH 1242 Calculus II (3)
PHYS 2101 Physics for Science and Engineering I (3)
PHYS 2101L Physics for Science and Engineering I Lab (1)

Major Courses (5054 hours)

ECGR 2103 Computer Utilization in C++ (3)
ECGR 2104 Computer Engineering Programming II (3)
ECGR 2111 Network Theory I (3)
ECGR 2112 Network Theory II (3)
ECGR 2155 Instrumentation and Networks Lab (1) (W)
ECGR 2156 Logic and Networks Lab (1) (W)*
ECGR 2181 Logic Systems Design I (3)
ECGR 2252 ECE Sophomore Design (2) (O)
ECGR 2255 Digital Design Lab (2)
ECGR 3101 Embedded Systems (3)
ECGR 3111 Signals and Systems (3)
ECGR 3123 Data Communications and Networking (3)
ECGR 3131 Fundamentals of Electronics and Semiconductors (3)
ECGR 3132 Electronics (3)
ECGR 3155 Systems and Electronics Lab (1) (W)
ECGR 3157 ECE Junior Design (2) (O)
ECGR 3159 Professional Practice (2)
ECGR 3181 Logic System Design II (3)

ECGR 3183 Computer Organization (3)
ECGR 3253 Senior Design I (2) (O, W)
ECGR 3254 Senior Design II (3) (O, W)
ECGR 4101 Embedded Systems (3)
ECGR 4124 Digital Signal Processing (3)
ECGR 4146 Introduction to VHDL (3)
ECGR 4232 Computer Engineering Senior Design I (2) (O, W)
ECGR 4242 Computer Engineering Senior Design II (3) (O, W)

Related Courses (2044 hours)

ENGR 3295 Multidisciplinary Professional Development (1)
MATH 1165 Introduction to Discrete Structures (3)
MATH 2171 Differential Equations (3)
PHYS 2102 Physics for Science and Engineering II (3)
PHYS 2102L Physics for Science and Engineering I Lab (1)
STAT 2122 Introduction to Probability and Statistics (3)
STAT 3128 Probability and Statistics for Engineers (3)
MATH 2164 Matrices and Linear Algebra (3)
MATH 2241 Calculus III (3)

Electives (1815 hours)

1 Science or Math Restricted Elective*
1 Advanced Problem Solving Elective**
1 Restricted Elective***
32 Depth Electives****
3 Technical Electives**

**The science restricted elective must be chosen from college-level chemistry, physical or biological science courses. The math restricted elective must be chosen from college-level, non-remedial mathematics or statistics courses. This elective course should complement the student's overall educational plan, and its content should be at a level above what is required by the student's Academic Plan of Study.*

***The advanced problem solving elective must be chosen from one of the following courses and should complement the student's overall educational plan.*

MATH 2164 Matrices and Linear Algebra (3)
MATH 2241 Calculus III (3)
MATH 3116 Graph Theory (3)
MATH 3166 Combinatorics (3)
OPRS 3111 Operations Research: Deterministic Models (3)
OPRS 3113 Operations Research: Probabilistic Models (3)
PHYS 3141 Introduction to Modern Physics (3)

****The restricted elective must be chosen from: engineering, computing and informatics, computer science, math, statistics, physics, chemistry, biology, or software and information systems. This elective course should complement the student's overall educational plan, and its content should be at a level above what is required by the student's Academic Plan of Study.*

*****For the depth elective requirement, choose three two courses from one of the following list: three areas:*

1) Communication and Signal Processing

ECGR 3090 Special Topics in Electrical Engineering (3) (approved case-by-case)
ECGR 3112 System Analysis II (3)
ECGR 4090 Special Topics in Electrical Engineering (3) (approved case-by-case)
ECGR 4103 Applied Computer Graphics (3)
ECGR 4123 Analog and Digital Communication (3)
ECGR 4125 Foundation of Optical Engineering (3)
ECGR 4139 Digital Communication Systems (3)
ECGR 4187 Data Communications and Networking II (3)
ECGR 4422 Random Processes and Optimum Filtering (3)

2) Hardware Systems

ECGR 3090 *Special Topics in Electrical Engineering (3) (approved case-by-case)*
ECGR 3133 *Solid State Microelectronics I (3)*
ECGR 3182 *Digital Electronics (3)*
ECGR 4090 *Special Topics in Electrical Engineering (3) (approved case-by-case)*
ECGR 4131 *Linear Integrated Electronics (3)*
ECGR 4132 *Analog Integrated Circuits Design (3)*
ECGR 4134 *Solid State & Semiconductor Microelectronics II (3)*
ECGR 4137 *Device Electronics for Integrated Circuits (3)*
ECGR 4138 *Electronic Thin Film Materials Devices (3)*
ECGR 4140 *Introduction to VLSI Processing (3)*
ECGR 4142 *Power System Analysis II (3)*
ECGR 4182 *Digital System Testing (3)*
ECGR 4188 *Advanced VLSI Systems Design (3)*
ECGR 4433 *VLSI Systems Design (3)*
3) Computer Architecture, Software, and Systems
ECGR 3090 *Special Topics in Electrical Engineering (3) (approved case-by-case)*
ECGR 4090 *Special Topics in Electrical Engineering (3) (approved case-by-case)*
ECGR 4102 *Engineering Simulation (3)*
ECGR 4103 *Applied Computer Graphics (3)*
ECGR 4111 *Control Systems Theory I (3)*
ECGR 4112 *Control Systems Theory II (3)*
ECGR 4161 *Introduction to Robotics (3)*
ECGR 4181 *Computer Architecture (3)*
ITCS 2214 *Data Structures (3)*
ITCS 3166 *Introduction to Computer Networks (3)*

ECGR 4090 *Special Topics (Approved case by case)*
ECGR 4103 *Applied Computer Graphics (3)*
ECGR 4111 *Control Systems Theory I (3)*
ECGR 4123 *Analog/Digital Communication (3)*
ECGR 4131 *Linear Integrated Electronics (3)*
ECGR 4146 *Introduction to VHDL (3)*
ECGR 4161 *Introduction to Robotics (3)*
ECGR 4181 *Computer Architecture (3)*
ECGR 4187 *Data Communications*
ECGR 4422 *Random Processes and Optimal Filtering (3)*
ITCS 2214 *Data Structures (3)*

***For the technical elective requirement, choose two courses from among any 4000 level or higher ECGR course that is not required as part of the curriculum. The remaining technical elective course may be chosen from among any 3000 level and higher ECGR, MATH, PHYS, or ITCS course that is not part of the degree requirements.*

Grade Requirements

All non-elective freshmen year courses must be completed with C or above prior to enrolling in any junior level courses.

Suggested Curriculum

For a suggested curriculum for this degree to map out a path toward completing the major, please see the Academic Plan of Study available online at academics.uncc.edu.

ECGR 2181. Logic Systems Design I. (3) Prerequisite: MATH 1242 with a grade of C or above or permission of department. Introduction to Boolean algebra; mixed logic; design of combinational circuits; introduction to sequential systems; MSI building blocks; digital systems design and test; design of multi-input based controller systems; programmable logic devices; includes laboratory design projects.

ECGR 2252. ECE Sophomore Design Electrical Engineering Design-I. (2) (O) Prerequisites: ECGR 2111 and ECGR 2155 or equivalents. Pre- or corequisites: ECGR 2112 and ECGR 2181 or equivalents. Introduction to the electrical engineering design process including teamwork, design specifications,

conceptual design, detailed design, design integration, cost estimation and market considerations. Product design projects are completed and laboratory prototypes are developed and tested by design teams. Oral presentations and written technical reports on the design projects are required.

ECGR 3101. Embedded Systems. (3) Prerequisite: ECGR 3183 with a grade of C or above. Introduction to designing microcontroller-based embedded computer systems using assembly and C programs. Examination of real-time operating systems and their impact on performance. Computer engineering applications will be emphasized.

ECGR 3157. Electrical Engineering ECE Junior Design II. (2) (O) Prerequisites: ECGR 2252, ECGR 3111 and ECGR 3131, each with a grade of C or better. ~~ECGR 2142, ECGR 2252, and ECGR 2181. Pre- or co-requisites: ECGR 3111 and ECGR 3131, or permission of the department.~~ Application of conceptual design; circuit design; parameter sensitivity analysis; cost-performance tradeoff analysis and interconnection compatibility design. A design project completed in a laboratory setting and a written technical report and oral presentation on the project are required.

ECGR 4231. Electrical Engineering Senior Design I. (2) Prerequisites: Senior standing in electrical engineering, ECGR 3121 and ECGR 3157, each with a grade of C or above. A project-oriented course stressing the planning and design of experiments to support the student's project. Formation of the design problem and specification. Credit will not be given for ECGR 4231 where credit has been given for ECGR 4232.

ECGR 4232. Computer Engineering Senior Design I. (2) Prerequisites: Senior standing in computer engineering, ECGR 3101 and ECGR 3157 each with a grade of C or above. A project-oriented course stressing the planning and design of experiments to support the student's project. Formation of the design problem and specification. Credit will not be given for ECGR 4232 where credit has been given for ECGR 4231.

ECGR 4241. Electrical Engineering Senior Design II. (3) Prerequisites: ECGR 4231, with a grade of C or above. A continuation of ECGR 4231 consisting of project development and analysis, culminating in written and oral presentations. Credit will not be given for ECGR 4241 where credit has been given for ECGR 4242.

ECGR 4242. Computer Engineering Senior Design II. (3) Prerequisites: ECGR 4232, with a grade of C or above. A continuation of ECGR 4232 consisting of project development and analysis, culminating in written and oral presentations. Credit will not be given for ECGR 4242 where credit has been given for ECGR 4241.

ACADEMIC PLAN OF STUDY (UNDERGRADUATE ONLY): Does the proposed change impact an existing Academic Plan of Study?

- Yes. If yes, please provide updated Academic Plan of Study in template format.
 No.

STUDENT LEARNING OUTCOMES (UNDERGRADUATE & GRADUATE): Does this course or curricular change require a change in SLOs or assessment for the degree program?

- Yes. If yes, please provide updated SLOs in template format.
 No.

TEXTBOOK COSTS: It is the policy of the Board of Governors to reduce textbook costs for students whenever possible. Have electronic textbooks, textbook rentals, or the buyback program been considered and adopted?

Yes. Briefly explain below.

No. Briefly explain below.

The use of electronic textbooks has been considered throughout the program and adopted wherever appropriate. The department will continue to look for opportunities to use electronic textbooks in the future.

IMPORTANT NOTE: A Microsoft Word version of the final course and curriculum proposal should be sent to facultygovernance@uncc.edu upon approval by the Undergraduate Course and Curriculum Committee and/or Graduate Council chair.