475: UNDERGRADUATE CERTIFICATE IN COMPUTER PROGRAMMING FOR ENGINEERS

In Workflow

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Approval Path

a. Sat, 11 Jun 2022 21:26:15 GMT
Debbie Rappaport (fjs556): Approved for SACSCOC Accreditation Liaison
b. Thu, 04 Aug 2022 19:10:26 GMT
Debbie Rappaport (fjs556): Approved for ECEN UG Curriculum Committee Chair
c. Thu, 04 Aug 2022 22:44:37 GMT
Mehdi Shadaram (pjw412): Approved for pjw412
d. Thu, 04 Aug 2022 22:53:03 GMT
Chunjiang Qian (atr923): Approved for ECEN Chair
e. Mon, 08 Aug 2022 20:38:45 GMT
Gabriela Romero Uribe (fzv548): Approved for EI UG Curriculum Committee Chair
f. Thu, 18 Aug 2022 17:16:11 GMT
Arturo Montoya (yyu793): Approved for EI Associate Dean of UG Studies
g. Mon, 22 Aug 2022 16:07:20 GMT
Kirstin Wilsey (kci427): Approved for EI Financial Lead
h. Mon, 22 Aug 2022 16:09:24 GMT
Jo Ann Browning (rux814): Approved for EI Dean
i. Mon, 22 Aug 2022 16:27:56 GMT
Heather Shipley (isg537): Approved for UG Vice Provost
j. Fri, 09 Sep 2022 13:50:03 GMT
Debbie Rappaport (fjs556): Rollback to Initiator
k. Mon, 19 Sep 2022 14:44:41 GMT
Lorrie Smith (lni126): Approved for SACSCOC Accreditation Liaison
l. Mon, 19 Sep 2022 15:26:48 GMT
Eugene John (sqg841): Approved for ECEN UG Curriculum Committee Chair
m. Mon, 19 Sep 2022 15:28:29 GMT
Chunjiang Qian (atr923): Approved for ECEN Chair
n. Mon, 19 Sep 2022 15:29:24 GMT
Jo Ann Browning (rux814): Approved for EI Dean

o. Thu, 22 Sep 2022 16:40:25 GMT
John Alexander (cgx343): Approved for EI UG Curriculum Committee Chair

p. Thu, 22 Sep 2022 16:41:56 GMT
Arturo Montoya (yyu793): Approved for EI Associate Dean of UG Studies

q. Tue, 27 Sep 2022 12:27:34 GMT
Kirstin Wilsey (kci427): Approved for EI Financial Lead

r. Tue, 27 Sep 2022 12:34:54 GMT
Jo Ann Browning (rux814): Approved for EI Dean

s. Tue, 27 Sep 2022 18:30:21 GMT
Heather Shipley (isg537): Approved for UG Vice Provost

t. Thu, 20 Oct 2022 16:47:36 GMT
Debbie Rappaport (fjs556): Approved for Academic Council Agenda Item Review

u. Thu, 20 Oct 2022 17:54:02 GMT
Heather Shipley (isg537): Approved for UG Academic Council Approval

New Program Proposal

Date Submitted: Sun, 18 Sep 2022 01:41:53 GMT

Viewing: 475 : Undergraduate Certificate in Computer Programming for Engineers
Last edit: Thu, 20 Oct 2022 16:47:13 GMT

Changes proposed by: Arturo Montoya (yyu793)

Administrative Information

Submitter Information

Name

Arturo H. Montoya

Email

ARTURO.MONTOYA@UTSA.EDU

Title

Associate Dean of Undergraduate Programs

Department

Electrical & Computer Engineer

Select Not Applicable for Department if this is a College Level Program. Then select the appropriate college.

College

Engineering/Integrated Design

Effective Catalog Edition

2022-2023

Is this an academic agreement with another entity outside UTSA?

No

New Program Proposal

Program Name

Undergraduate Certificate in Computer Programming for Engineers

Desired Implementation Date

09/01/2022

Program Type

Undergraduate Certificate

Program Level

Undergraduate

CIP Code

110202 - Computer Programming, Specific Applications.

Percent of new courses for the degree

0% - repackaging of existing courses

Method of Delivery

Hybrid/Blended (51-85% online)

Is this a college-level program?

No

A college-level program is a degree program associated with a college instead of a department.

Is this program in collaboration with another department at UTSA, dependent on other courses (i.e., pre-reqs) or programs, or impact other course or program offerings?

Yes

Collaborating Department(s)

Department
Computer Science

Mission: Describe how the credential/degree aligns with the institutional mission or institutional strategic plan.

We are in the era where high-tech has penetrated all aspects of society. Technologies that serve as the backbone of our modern society such as Artificial Intelligence, Internet of Things and Cloud Computing are powered by computer programs at their cores. Embedded systems, such as smart thermostats, smart sensors and smart locks, have become pervasive in our society. There is no doubt that technology has permeated every possible industrial sector. The U.S. Bureau of Labor Statistics (BLS) predicts more than 200,000 openings per year over this decade (i.e., 2 million jobs by 2030) for various computer programming related roles with a Bachelor's degree. In San Antonio, three key-targeted industries identified by the SA2020 Board are Healthcare & Bioscience, Information Technology and Cybersecurity, and Advanced Manufacturing, all of which are supported by computer programs. Currently, in San Antonio, a long list of companies, including Southwest Research Institute, USAA, Valero, HEB, Wells Fargo, Accenture, and UTSA are looking for computer programming related specialists. Given the projected job growth of more than 22% in this arena by BLS, universities such as UTSA have the opportunity to develop innovative approaches to meet the demand. The proposed UC-CPE program is a response to the growing demands to better prepare the current and future workforce.

Currently, there are no certificate programs at the undergraduate level at UTSA that systematically teach programming tailored for engineers. UC-CPE is proposed to address this deficiency. UC-CPE will particularly focus on offering courses that teach programming basics and applications in engineering related subject areas, including robotics, internet of things, smart power grid and autonomous vehicles.

Demonstrated need: Provide evidence of the job market and workforce need for the proposed credential/degree (include burning glass and other workforce related data). Consider the impact of the program title on recruitment (SEO/SEM).

This program is a response to local, national, global job market demands in the high-tech field. The proposed UC-CPE program will provide independent undergraduate student learning on computer programming through coursework. This certificate was developed in collaboration with the Department of Computer Science.

The effects on enrollment are only positive. Current UTSA electrical & computer engineering (ECE) students will still be pursuing their B.S. degrees. Any special undergraduate student admissions can only raise enrollment.

All courses are taken from the existing undergraduate programs of ECE. Based on our experiences in offering the program, we will also include courses from other engineering departments (e.g., mechanical) in the future.

Existing Programs: Demonstrate the relationship between the proposed program and existing programs and any potential effects on enrollment for existing programs.

Current undergraduate ECE students will already be eligible for admission to the certificate program. They must simply submit a short form stating their desire to pursue certification. Non-UTSA students who do not wish to also be admitted into the regular ECE programs must apply via the University's special undergraduate admission process. It is envisioned that most special students would be practicing engineers who already possess a BS in electrical or computer engineering, or a related field.

Student demand: Provide evidence of both short-term and long-term student demand for the credential/degree (include analysis of RNL demand data on competitor programs).

The following projections are conservatively based on current enrollment in courses that are relevant to software (e.g., EE 3223 (C++ and Data Structures): 75, EE 3233 (System Programming for Engineers): 70, EE 4953 (Engineering Programming II): 11, EE 4953 (Computer and Network Security): 21, EE 4953 (Robotics): 12, etc.)

- Year 1: Total New Students= 20; Attrition= 5; Cumulative Headcount: FTE=15; Graduates=0;
- Year 2: Total New Students= 25; Attrition= 5; Cumulative Headcount: FTE=20; Graduates=0;

- Year 3: Total New Students= 30; Attrition= 5; Cumulative Headcount: FTE=25; Graduates=15;
- Year 4: Total New Students= 35; Attrition= 5; Cumulative Headcount: FTE=30; Graduates=20;
- Year 5: Total New Students= 35; Attrition= 5; Cumulative Headcount: FTE=30; Graduates=25;

Faculty availability: Provide information on appropriately-credentialed faculty available to teach courses in the program or a plan to hire additional faculty to support the program if applicable.

There is sufficient core and support faculty to teach the scope of the discipline, consistent with similar programs in the state and nation. The proposed certificate has sufficient resources, including those at the UTSA library, classrooms, facility, and teaching and research labs at ECE, to support it.

Curriculum: Discuss or provide outline of the curriculum designed to build workforce-specific skills and knowledge, including new courses that will be needed. Describe what career-engaged learning experiences are incorporated in the curriculum to prepare students for the intended workforce. Work with Undergraduate Studies to produce Curricular Analytics Program map to show student movement through a program. For graduate programs, consider aligning research and thesis hours with time to degree.

An electrical or computer engineering undergraduate student pursuing this certification would take two required courses and three technical electives for a total of 15 SCH:

Two required courses:

a. CPE 2073 Introduction to Computer Programming for Engineers or

CS 2073 Computer Programming with Engineering Applications or

CS 1714 Computer Programming II

2. EE 3223 C++ and Data Structures or

CS 2124 Data Structures

Three elective courses from:

a. EE 3233 Systems Programming for Engineers (or CS 3424 Systems Programming)
b. EE 4953 Topic: Engineering Programming
c. CS 3443 Application Programming
d. EE 4953 Topic: Intro to Computer and Network Security
e. CS 3433 Computer and Information Security
f. EE 4453 Machine Learning (or CS 4253 Machine Learning)
g. EE 4953 Topic: Internet of Things (IOT)
h. CS 4643 Cellular & Mobile Technologies
i. EE 4733 Intelligent Control
j. CS 4863 Distributed Computing and Systems
k. EE 4723 Intelligent Robotics
l. CS 4833 Embedded Systems
m. EE 4953 Topic: Robotics
n. CS 4853 Advanced Systems Programming
o. Other software and programming electives approved by the committee

Workforce: Discuss how relevant workforce representatives from business, industry, non-profits, etc. have been involved/consulted in the creation and design of the program. Describe the planned ongoing engagement after program launch to review and revise program curriculum.

Not applicable. Edits were made to the original proposal when it routed for approvals. This question was not part of the original proposal when submitted in CL in June.

Program Assessment and Evaluation: Clearly articulate the program objectives and a plan to assess student outcomes. The department/school or other unit overseeing the program of study should have a continuous improvement process in place that informs curriculum revision to better achieve the objectives of the program.

Not applicable. Edits were made to the original proposal when it routed for approvals. This question was not part of the original proposal when submitted in CL in June.

Costs and Revenues: (done with AA Financial and Administrative Team) Provide a business plan proforma that lays out the anticipated costs of the program, the anticipated revenues and any new investments needed to meet all costs, including instruction, outreach/marketing, administration, etc.

Not applicable. Edits were made to the original proposal when it routed for approvals. This question was not part of the original proposal when submitted in CL in June.

Attach File

UC-CPE.docx
New Degrees and other programs Proposal_CPE Certificate.docx

Is this a new doctoral program?
No

Degree Credit Hours
15

Catalog Integration

Catalog Integration: Provide a description of the program, including any program-specific or department-specific admission requirements.

The undergraduate certificate program in Computer Programming for Engineers at the Electrical and Computer Engineering (UC-CPE) is designed so that students or professionals in electrical & computer engineering or related fields can take a focused set of courses pertinent to the broad field of computer programming. This certificate was developed in collaboration with the Department of Computer Science.

Eligibility and Admission Procedures

Current undergraduate electrical & computer engineering (ECE) students will already be eligible for admission to the certificate program. They must simply submit a short form stating their desire to pursue certification. Non-UTSA students who do not wish to also be admitted into the regular ECE programs must apply via the University's special undergraduate admission process. This is the suggested option for practicing engineers who already possess a BS in electrical or computer engineering or related field.

Degree Requirements – For undergraduate programs, list the required/core courses, general education courses, and prescribed and free elective courses for the program, along with total semester credit hours required. For graduate programs, list the required/core courses, support courses, approved elective courses, thesis/non-thesis option (master's) and doctoral requirements for the program, along with total semester credit hours required.

Certificate Requirements

The program consists of two 3-hour required courses and three 3-hour electives for a total of 15 credit hours.

Two required courses:

a. CPE 2073 Introduction to Computer Programming for Engineers or CS 2073 Computer Programming with Engineering Applications or CS 1714 Computer Programming II
b. EE 3223 C++ and Data Structures or CS 2124 Data Structures

Three elective courses from:

a. EE 3233 Systems Programming for Engineers (or CS 3424 Systems Programming)
b. EE 4953 Topic: Engineering Programming
c. CS 3443 Application Programming
d. EE 4953 Topic: Intro to Computer and Network Security
e. CS 3433 Computer and Information Security
f. EE 4453 Machine Learning (or CS 4253 Machine Learning)
g. EE 4953 Topic: Internet of Things (IOT)
h. CS 4643 Cellular & Mobile Technologies
i. EE 4733 Intelligent Control
j. CS 4863 Distributed Computing and Systems
k. EE 4723 Intelligent Robotics
l. CS 4833 Embedded Systems
m. EE 4953 Topic: Robotics
n. CS 4853 Advanced Systems Programming
o. Other Computer Programming electives approved by the committee

Supporting Documentation and Review

UT System and THECB Requirements for this Proposal/Notes
Does not need UT System or THECB approval

SACSCOC Requirements for this Proposal/Notes
Does not need SACSCOC approval

Reviewer Comments
Debbie Rappaport (fjs556) (Thu, 04 Aug 2022 19:10:15 GMT): Per Dr. Montoya's request, adding Dr. Shadaram to the workflow and approving on behalf of the ECEN UG Curriculum Committee Chair, Dr. Eugene John. Dr. John is on vacation. Dr. Shadaram will review proposal on his behalf.
Debbie Rappaport (fjs556) (Fri, 09 Sep 2022 13:50:03 GMT): Rollback: Per Arturo's request - roll back to edit proposal.

Lorrie Smith (lni126) (Mon, 19 Sep 2022 14:44:36 GMT): This was submitted in June prior to the changes to the new program proposal template, which added the new questions. It had to be rolled back for updates and to rename the certificate. This does not need UT System, THECB, or SACSCOC approval.

Debbie Rappaport (fjs556) (Thu, 20 Oct 2022 16:47:13 GMT): Approved by Academic Council on Oct. 19, 2022

Key: 475