UNDERGRADUATE CURRICULUM CHANGE MEMO

Date: 01/05/2022

From: Dr. Robert Roberts, Department of Electrical and Computer Engineering

Through: Dr. Miguel Velez-Reyes, Chair, Department of Electrical and Computer Engineering

Through: Dr. Virgilio Gonzalez, Chair, College of Engineering Curriculum Committee

Through: Louis Everett, Associate Dean for Academic Affairs and Undergraduate Studies, College of Engineering

Through: Dr. Patricia Nava, Interim Dean, College of Engineering

To: Dr Andrew Fleck, Chair, Undergraduate Curriculum Committee

Proposal Title: Minor in Robotics and Autonomous Systems

The minor in Robotics and Autonomous Systems consists of a minimum of 16 credit hours, representing fundamental areas of knowledge in Electrical and Computer Engineering. The main objective of the program is to offer interested students with GPAs of 3.00 or above the opportunity to develop their expertise in the high demand areas of embedded systems, signal processing, robotics, and controls.

The proposal includes the creation of EE 3360 - Introduction to Robotics and Autonomous Systems. This course has been offered two times as special topics in the past and will provide an introduction to key robotics concepts into the Electrical or Computer Engineering curriculum.

CURRICULUM CHANGE PROPOSAL

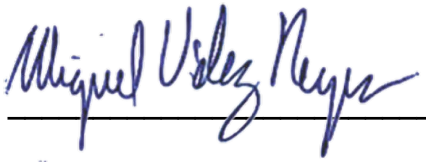
APPROVAL PAGE

Proposal Title: Minor in Robotics and Autonomous Systems

College: Engineering Department: Electrical and Computer Engineering

DEPARTMENT CHAIR

I have read the enclosed proposal and approve this proposal on behalf of the department.



Signature

January 13, 2022

Date

COLLEGE CURRICULUM COMMITTEE CHAIR

I have read the enclosed documents and approve the proposal on behalf of the college curriculum committee.

Signature

Date

COLLEGE DEAN

I have read the enclosed documents and approve the proposal on behalf of the college. I certify that the necessary funds will be allocated by the college in support of this proposal.

Signature

Date

From: Granda, Virginia D
To: Rivera, Julie A
Subject: FW: UG Proposals Approved by our COECC
Date: Tuesday, January 25, 2022 10:40:35 AM
Attachments: image001.png
AEME--Changes to BSME and BS-AEAE Proposal.pdf
BSCEM Undergraduate Curriculum Change (revised).pdf
EEL--Changes to the BS-EIL-Course-Prerequisites-and-Catalog.pdf
MMBME Course Changes.pdf
ECE RA Minor Proposal - Revised.pdf
image004.png

Good morning Julie,

Attached are the approved UG proposals from our college.

Have a great week,

Virginia

Virginia Granda-Becker
Coordinator for Undergraduate Studies
and Academic Affairs

Enineering Edge Center
ENGR E-201B
The University of Texas at El Paso
500 WW. University Ave.
El Paso, TX 79968
Office: 915-747-8011
www.utep.edu/engineering/eec

From: Nava, Patricia A.
Sent: Tuesday, January 25, 2022 10:29 AM
To: Granda, Virginia D <granda@utep.edu>
Subject: RE: Updated Memo

All of the actions are approved.

From: Granda, Virginia D
Sent: Tuesday, January 25, 2022 8:52 AM
To: Nava, Patricia A. <pnava@utep.edu>
Subject: Updated Memo

Dr. Nava,

Per your request, attached is the modified memo from AEME.

Best Regards,

Virginia

Virginia Granda-Becker
Coordinator for Undergraduate Studies
and Academic Affairs

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500 WW. University Ave.
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Good afternoon Dr. Nava,

Attached are the UG Proposals that have been approved.

Please reply letting me know if you approve them.

Best Regards,

Virginia

Virginia Granda-Becker
Coordinator for Undergraduate Studies and Academic Affairs

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The University of Texas at El Paso
500 W. University Ave
El Paso, TX 79968
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www.utep.edu/engineering/eec

From: Everett, Louis
Sent: Monday, January 10, 2022 9:35 AM
To: Granda, Virginia D <granda@utep.edu>
Subject: Re: UG Proposals Approved by our COECC

I approve

Get Outlook for iOS

From: Granda, Virginia D <granda@utep.edu>
Sent: Monday, January 10, 2022 9:00:58 AM
To: Everett, Louis <leverett@utep.edu>

Subject: FW: UG Proposals Approved by our COECC

Good morning Dr. Everett,

Attached are the UG proposals that have been approved by the COECC and its chair.

Please reply letting me know if you approve them.

Best Regards,

Virginia

Virginia Granda-Becker
Coordinator for Undergraduate Studies and Academic Affairs

College of Engineering
The University of Texas at El Paso
500 W. University Ave
El Paso, TX 79968
Office: (915) 747-8011
www.utep.edu/engineering/eec

From: Gonzalez, Virgilio
Sent: Friday, January 7, 2022 5:04 PM
To: Granda, Virginia D <granda@utep.edu>
Subject: RE: UG Proposals Approved by our COECC

Virginia,
I approve the proposals reviewed in today's CoECC meeting.

Thank you

Virgilio Gonzalez
vgonzalez3@utep.edu

From: Granda, Virginia D <granda@utep.edu>
Sent: Friday, January 7, 2022 16:28
To: Gonzalez, Virgilio <vgonzalez3@utep.edu>
Subject: UG Proposals Approved by our COECC

Good afternoon Dr. Gonzalez,

Attached are the undergraduate proposals that were approved by our COECC today.

Can you please reply to this email if you approve the proposals?

Best Regards,

Virginia

Virginia Granda-Becker
Coordinator for Undergraduate Studies and Academic Affairs

College of Engineering
The University of Texas at El Paso
500 W. University Ave
El Paso, TX 79968
Office: (915) 747-8011
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Catalog Copy for Minors

Minor in Robotics and Autonomous Systems

The Minor in Robotics and Autonomous Systems consists of a minimum of 16 credit hours, representing fundamental areas of knowledge in the fields of robotics and autonomous systems. Undergraduate students interested in the minor in Robotics and Autonomous Systems must select the coursework with an advisor in order to receive the minor. The main objective of the program is to offer interested students with GPAs of 3.00 or above in any field of study the opportunity to enhance their capabilities in their own profession by developing expertise in the high demand areas of embedded systems, signal processing, robotics, and controls. These courses generally have prerequisites, and their enrollment will need approval by the Electrical and Computer Engineering Department

Degree Requirements

Enrolled students must complete a minimum of 16 credit hours in consultation with an advisor and maintain a GPA of 3.00 or above.

Degree Plan

Code	Title	Hours
Required Courses:		**10**
EE2369,	Digital Systems Design I	3
EE2169	EE 2369 Laboratory	1
EE3353	Discrete Time signals and Systems	3
EE3360	Introduction to Robotics and Autonomous Systems	3
Prescribed Elective Courses:		
Select at least six credits of the following:		6
EE3354	Intro. to Communication Networks	
EE4356	Real Time Signal Processing	
EE4357	Biomechatronics	
EE4364	Systems and Controls	
EE4365	Fundamentals of Deep Learning	
EE4395	Special Topics-Electrical Engr (related to robotics)	
EE 4171 / 4371	Engineering Problem Seminar (related to robotics project)	
EE 4196	Special Topics Lab in ECE (related to robotics)	
EE 33xx / EE43xx EE elective course (optional by Department approval)		
Total Hours		**16 or more**

The University of Texas at El Paso

College of Engineering
Department of Electrical and Computer Engineering
Program

Minor in Robotics and Autonomous Systems

TABLE OF CONTENTS

Request Form for a New Minor

Administrative Information

1. Institution: University of Texas at El Paso

2. Program Name – (*e.g., Minor in Women's Studies*): Minor in Robotics and Autonomous Systems

3. Proposed CIP Code: 14.0901.00 06

4. Number of Required Semester Credit Hours (SCHs): 16

5. Brief Program Description – Describe the minor and the educational objectives:

The Minor in Robotics and Autonomous Systems consists of a minimum of 16 credit hours, representing fundamental areas of knowledge in the fields of robotics and autonomous systems. Undergraduate students interested in the minor in Robotics and Autonomous Systems must select the coursework with an advisor in order to receive the minor. The main objective of the program is to offer interested students with GPAs of 3.00 or above in any field of study the opportunity to enhance their capabilities in their own profession by developing expertise in the high demand areas of embedded systems, signal processing, robotics, and controls. These courses generally have prerequisites, and their enrollment will need approval by the Electrical and Computer Engineering Department.

6. Administrative Unit – Identify where the minor would fit within the organizational structure of the university (*e.g., The Department of Electrical Engineering within the College of Engineering*):

The Department of Electrical and Computer Engineering within the College of Engineering

7. Proposed Implementation Date – Report the date that students would enter the minor (MM/DD/YY): 09/01/22

8. Contact Person – Provide contact information for the person who can answer specific questions about the minor:

Name: Miguel Velez-Reyes

Title: Professor

E-mail: mvelezreyes@utep.edu

Phone: 915-747-5470

Minor Information

I. Need

A. Job Market Need – Provide short- and long-term evidence of the need for graduates in the job market.

The need for engineers with skills in robotics and autonomous systems has shown sustained need from industry for more than a decade. This can been seen in the National Robotics Initiative, which is currently in its 3.0 phase, that is investing in research and development in robotics from a multitude of federal agencies including NSF, USA, NASA, DOT, and NIH[1]. The Bureau of Labor Statistics expects 6.4% job growth in robotics from 2016-2026, with a projected need for 12,500 robotics engineers in that period[2]. Texas ranks #2 in the US in robotics engineers, with ~10,760 employed in the state[2], and with companies including Apple, SpaceX, Amazon, Tesla, and Blue Origin expanding their footprints in the state, the need for robotics engineers should continue to grow. The high pace of innovation in robotics and autonomous systems, such as the incorporation of technologies for telepresence and artificial intelligence (AI) also means that there is a strong demand for a new generation of engineers in the field, who are trained in these areas[3]. With an average salary of $81,831 for a robotics position, these additional skills will enable our students to earn handsome compensation for their skills[3]. Further, as COVID-19 has strained the global supply chain, and caused many companies to rethink their business practices, there are predictions of further acceleration of automation trends in industry, further driving the demand[4].

1. https://beta.nsf.gov/funding/opportunities/national-robotics-initiative-30-innovations-integration-robotics-nri-30
2. https://www.careerexplorer.com/careers/robotics-engineer/job-market/
3. https://www.roboticstomorrow.com/article/2019/06/the-robotics-engineering-job-market-expected-growth-and-changes/13812
4. https://www.latimes.com/politics/story/2021-05-04/covid-automation-robots-trends-effects-on-workers

B. Student Demand – Provide short- and long-term evidence of demand for the minor.

In recent years, there has been increasing demand from students in the areas of robotics and autonomous systems. The IEEE student chapter at UTEP has organized a “Micromouse” maze-solving robot for years, and participating students have asked for more opportunities to explore robotics. The number of students engaged in this activity were 31 in Fall 2019 and 51 in Fall 2021. The event not held in 2020 due to Covid-19. This sustained interest led to the ECE Department offering Mobile Robotics as an EE4395 Special Topic in Spring 2021, it quickly filled to capacity. The course is again being offered in Spring 2022 and has again showed strong enrollment. Meanwhile, in the past three years the ECE Department has seen a student chapter of the IEEE Robotics and Automation Society (IEEE-RAS) form and become quite active, with 30 student members from multiple engineering disciplines. IEEE-RAS students are currently competing in 4 different national robotics competitions.

These students have expressed keen interest in further opportunities to explore robotics inside their degree plan. Students in Mechanical Engineering and Computer Science have been particularly interested in discussions on a minor, as it would allow them a formal path to augment their major with ECE-centric robotics topics.

C. Enrollment Projections – Use this table to show the estimated cumulative headcount and full-time student equivalent (FTSE) enrollment for the first five years of the minor.

YEAR	1	2	3	4	5
Headcount	3	6	10	13	16
FTSE					

II. Quality

A. Degree Requirements – Use this table to show the degree requirements of the minor. *(Modify the table as needed; if necessary, replicate the table for more than one option.)*

Category	Semester Credit Hours	Clock Hours
Required Courses	10	
Prescribed Electives	6	
Free Electives	0	
Other *(Specify, e.g., internships, clinical work)*	(if not included above)	
TOTAL	16	

Note: A Bachelor degree should not exceed 120 Semester Credit Hours (SCH) per Board rule 5.44 (a) (3). Those that exceed 120 SCH must provide detailed documentation describing the compelling academic reason for the number of required hours, such as programmatic accreditation requirements, statutory requirements, or licensure/certification requirements that cannot be met without exceeding the 120-hour limit.

B. Curriculum – Use these tables to identify the required courses and prescribed electives of the minor. Note with an asterisk (*) courses that would be added if the minor is approved. *(Add and delete rows as needed. If applicable, replicate the tables for different tracks/options.)*

Required Courses

Prefix and Number	Course Title	SCH
EE 3353	Discrete Time Signals and Systems	3

EE 3360	Introduction to Robotics and Autonomous Systems	3
EE 2369	Digital Systems Design I	3
EE 2169	EE 2369 Laboratory	1

Prescribed Elective Courses

Prefix and Number	Course Title (Select at least six credits of the following)	SCH
EE 4364	Systems and Controls	3
EE 4356	Real time Digital Signal Processing	3
EE 4357	Biomechatronics	3
EE 4365	Fundamentals of Deep Learning	3
EE 3354	Introduction to Communication Networks	3
EE 4171	Engineering Problem Seminar (related to robotics project)	1
EE 4371	Engineering Problem Seminar (related to robotics project)	3
EE 4395	Special Topics	3
EE 4196	Special Topics Lab in ECE (related to robotics)	1
EE 33xx/ EE 43xx	EE elective course (optional by Department approval)	3

Free Elective Course Menu

Prefix and Number	Course Title	SCH

Other

Prefix and Number	Course Title	SCH

C. Faculty – Use these tables to provide information about Core and Support faculty. Add an asterisk (*) before the name of the individual who will have direct administrative responsibilities for the program. *(Add and delete rows as needed.)*

Name of Core Faculty and Faculty Rank	Highest Degree and Awarding Institution	Courses Assigned in Program	% Time Assigned To Program

Robert C Roberts, Assistant Professor	PhD in Electrical Engineering Case Western University	EE 3360, EE4357, EE4196	100%
Patricia Nava, Professor	PhD in Electrical Engineering New Mexico State University	EE 4365	100%
Rodrigo Romero, Associate Professor of Practice	PhD in Electrical and Computer Engineering University of Texas at El Paso	EE 4171, EE4395	100%
Hector Erives	PhD in Electrical Engineering New Mexico State University	EE 4364	100%
Sergio Cabrera	PhD in Electrical Engineering Rice University	EE 3353, EE4395	100%
Ricardo Von Borries	PhD in Electrical Engineering Rice University	EE 4356	100%
Virgilio Gonzalez	PhD in Computer Engineering University of Texas at El Paso	EE 4371, EE 2369-2169, EE 3354	100%
Miguel Velez-Reyes	PhD in Electrical Engineering, Massachusetts Institute of Technology	EE 4364, EE3353, EE4395, EE 4196, EE 4171	12.5%

Name of Support Faculty and Faculty Rank	**Highest Degree and Awarding Institution**	**Courses Assigned in Program**	**% Time Assigned To Program**

D. Students – Describe general recruitment efforts and admission requirements. In accordance with the institution's Uniform Recruitment and Retention Strategy, describe plans to recruit, retain, and graduate students from underrepresented groups for the minor.

We will utilize our existing strategies for recruitment and retention.

E. Library – Provide the library director's assessment of library resources necessary for the minor. Describe plans to build the library holdings to support the minor.

All the resources for Computer Engineering, Electrical Engineering and other engineering disciplines are in good standing to support any / all majors and minors in Robotics and Autonomous Systems and other engineering degree programs.

F. Facilities and Equipment – Describe the availability and adequacy of facilities and equipment to support the minor. Describe plans for facility and equipment improvements/additions.

We will leverage existing laboratory facilities for the minor. Our existing Signal Processing, Systems and Communications BS concentration area, and MS in Electrical Engineering have required us to already have the necessary facilities and equipment. The existing resources will be capable of handling the expected additional demand as shown in projected enrollment.

G. Accreditation – If the discipline has a national accrediting body, describe plans to obtain accreditation or provide a rationale for not pursuing accreditation.

No accreditation required.

H. Evaluation – Describe the evaluation process that will be used to assess the quality and effectiveness of the new minor.

The program will be evaluated by the metrics of success regarding the numbers of students enrolled and graduating with the minor.

We will also leverage existing assessment process related to ABET accreditation to evaluate student meeting learning outcomes for individual courses.

III. Costs and Funding[1]

Five-Year Costs and Funding Sources - Use this table to show five-year costs and sources of funding for the program.

No budgetary implications.

Five-Year Costs		Five-Year Funding	
Personnel[1]	$0	Reallocated Funds	$0
Facilities and Equipment	$0	Anticipated New Formula Funding[3]	$0
Library, Supplies, and Materials	$0	Special Item Funding	$0
Other[2]	$0	Other[4]	$0
Total Costs	**$0**	**Total Funding**	**$0**

1. Report costs for new faculty hires, graduate assistants, and technical support personnel. For new faculty, prorate individual salaries as a percentage of the time assigned to the program. If existing faculty will contribute to program, include costs necessary to maintain existing programs (e.g., cost of adjunct to cover courses previously taught by faculty who would teach in new program).
2. Specify other costs here (e.g., administrative costs, travel).
3. Indicate formula funding for students new to the institution because of the program; formula funding should be included only for years three through five of the program and should reflect enrollment projections for years three through five.
4. Report other sources of funding here. In-hand grants, "likely" future grants, and designated tuition and fees can be included.

[1] Please use the "Program Funding Estimation Tool" found on the CB website to correctly estimate state funding.

COURSE ADD

All fields below are required

College : Engineering Department : Electrical and Computer Engineering

Rationale for adding the course:
This course adds an introduction to robotics and autonomous systems to the ECE curriculum.

All fields below are required

Subject Prefix and # EE 3360

Title (29 characters or fewer): Intro Robotics and Auto Syst

Dept. Administrative Code : 936

CIP Code 14 .4701 .00 06

Departmental Approval Required ☐Yes ☒No

Course Level ☒UG ☐GR ☐DR ☐SP

Course will be taught: ☒ Face-to-Face ☐ Online ☐ Hybrid

How many times may the course be taken for credit? (Please indicate 1-9 times): 1

Should the course be exempt from the "Three Repeat Rule?" ☐Yes ☒No

Grading Mode: ☒Standard ☐Pass/Fail ☐Audit

Description (600 characters maximum):
Introduction to Robotics and Autonomous Systems: Robotics and autonomous systems are rapidly growing technologies inside of engineering to increase the efficiency of existing processes, as well as to provide new capabilities to benefit humanity. This project based class seeks to provide an introduction to robotics fundamentals including embedded programming, control systems, sensors, motors, navigation, obstacle avoidance, and state machines.

Contact Hours (per week): 2 Lecture Hours 3 Lab Hours Other

Types of Instruction (Schedule Type): Select all that apply

☒ A	Lecture	☐ H	Thesis
☒ B	Laboratory	☐ I	Dissertation
☐ C	Practicum	☐ K	Lecture/Lab Combined
☐ D	Seminar	☐ O	Discussion or Review (Study Skills)
☐ E	Independent Study	☐ P	Specialized Instruction
☐ F	Private Lesson	☐ Q	Student Teaching

Fields below if applicable

If course is taught during a part of term in addition to a full 16-week term please indicate the length of the course (ex., 8 weeks): N/A

TCCN (Use for lower division courses) :

Prerequisite(s):		
Course Number/ Placement Test	Minimum Grade Required/ Test Scores	Concurrent Enrollment Permitted? (Y/N)
EE2369	C or Better	N
EE3353	C or Better	Y

Corequisite Course(s):

Equivalent Course(s):

Restrictions:	
Classification	
Major	

The University of Texas at El Paso
College of Engineering
Department of Electrical and Computer
Syllabus

Course Prefix and Number: EE3360
Course Title: Introduction to Robotics and Autonomous Systems
Credit Hours: 3.0

Prerequisite Courses: EE2369 and EE3353 (Can be taken concurrently)

Course Description: Introduction to Robotics and Autonomous Systems: Robotics and autonomous systems are rapidly growing technologies inside of engineering to increase the efficiency of existing processes, as well as to provide new capabilities to benefit humanity. This project based class seeks to provide an introduction to robotics fundamentals including embedded programming, control systems, sensors, motors, navigation, obstacle avoidance, and state machines.

Learning Outcomes: (Describe the measurable learning outcomes for the course.)
Students enrolled in this course will have the following learning outcomes.

- Improved embedded systems programming skills, including complex projects.
- The ability to communicate technical ideas clearly through an engineering notebook.
- The ability to work in teams to design a complex robotics system to solve a provided task.
- Fundamental robot subsystem component knowledge including motors, sensors, communications, and state machines.
- The ability to solve an unknown problem using robotic hardware under a defined deadline.

Required Materials: This is an project based hands-on course. Handouts and supplementary materials will be provided to help guide students through concepts and procedures. The following textbook may serve as useful references for students additionally:

Jonathan W. Valvano, “Embedded Systems – Introduction to Robotics,” 2020, ISBN:0-8194-5977-1978-1074544300

Course Policies: (Grading, attendance, academic integrity, etc.)

Attendance: In order to be successful in the course, attendance is highly recommended every scheduled day, in order to keep up with the work. This means that the student should read/watch all provided content and complete lab activities

prior to the next class period. Should a situation arise when a student begins to get behind, they should communicate with the instructor promptly to ensure they do not miss any important information and can get back on track.

Course Grading: Students will be evaluated in the following manner:

Lab Modules:	30%
Midterm Competition	15%
Final Competition	25%
Engineering Notebook	30%
TOTAL	100%

Scholastic Integrity: As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the Department are expected to observe appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work or material that are attributable in the whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Engineering Dean's Office and the Office of the Dean of Students. The Dean of Students will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University. See the Office of the Dean of Students' home page at www.utep.edu/dos/acadintg.htm for more information.

Course Statements:

Policy relating to Disability / CASS: In Section 504 of the Vocational Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, if a student needs an accommodation then the Office of Disabled Student Services located at UTEP need to be contacted. If you have a condition, which may affect your ability to perform successfully in this course, you are encouraged to discuss this in confidence with the instructor and/or the director of the Disabled Student Services. Written guidelines r/t accommodations from CASS must be submitted to the course manager PRIOR to the start of the course. If you have a disability and need classroom accommodations, please contact CASS at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.sa.utep.edu/cass. *CASS' Staff are the only individuals who can validate and if need be, authorize accommodations for students with disabilities.*

Course Schedule:

Course Drop Deadline: April 1st

Drop Policy: Students can drop the course before April 1st with a grade of "W". Students who drop the course after April 1st will be assigned the grade earned in the course.

Week	Date	Topic
1	**Jan 19**	Introduction to class / Class Goals Class requirements / Class Schedule
	Jan 21	Module 1 (Lecture and Lab) – Running code on the Launchpad
2	**Jan 26**	Module 2 (Lecture ONLY) – Voltage, Current, and Power Module 3 (Lecture ONLY) – ARM Cortex 4
	Jan 28	Module 4 (Lecture and Lab) – MSP432 Software Design
3	**Feb 2**	Module 5 (Lecture and Lab) – Building the Robot
	Feb 4	Module 6 (Lecture and Lab) – GPIO
	Feb 5	Check in #1 (All work including Module due.)
4	**Feb 9**	Module 7 (Lecture and Lab) – Finite State Machines
	Feb 11	Module 8 (Lecture and Lab) – Interfacing Input and Output
5	**Feb 16**	Module 9 (Lecture and Lab) – SysTick Timer
	Feb 18	Module 10 (Lecture and Lab) Debugging Real-time Systems
6	**Feb 23**	Module 11 (Lecture and Lab) – Displays/UART
	Feb 25	Module 12 (Lecture and Lab) – DC Motors
	Feb 26	Check in #2 (All work including Module 11 due.)
7	**Mar 2**	Module 13 (Lecture and Lab) – Timers
	Mar 4	CHALLENGE 1 – Line Following Robot

Week	Date	Topic
8	**Mar 9**	CHALLENGE 1 – Line Following Robot
	Mar 11	CHALLENGE 1 – Line Following Robot
9	**Mar 16**	Spring Break – No Class
	Mar 18	Spring Break – No Class
10	**Mar 22**	Check in #3 (Module 1-13, and Midterm Contest due.)
	Mar 23	Module 14 (Lecture and Lab) – Real-time Systems
	Mar 25	Module 15 (Lecture and Lab) – Data Acquisition Systems
11	**Mar 30**	Module 16 (Lecture and Lab) - Tachometer
	Apr 1	Module 17 (Lecture and Lab) – Control Systems
12	**Apr 6**	Module 18 (Lecture and Lab) – Serial Communication
	Apr 8	Module 20 (Lecture and Lab) – Wifi
13	**Apr 13**	Module 21 – Sensor Integration
	Apr 15	CHALLENGE 2 – MAZE RACING
	Apr 16	Check in #4 (All work for all Modules due.)
14	**Apr 20**	CHALLENGE 2 – MAZE RACING
	Apr 22	CHALLENGE 2 – MAZE RACING
15	**May 4**	CHALLENGE 2 – MAZE RACING
	May 6	CHALLENGE 2 – MAZE RACING → Competition Day