**CAC 240A: Robotics**

**Fall 2022**

**Course Description**

This is a fundamental robotics course. Topics will include the ideas and components and software that drive a cyber physical system.

**Professor Information**

Dr. Anthony Winchester

Office: Olin 209

Email: [agwinche@bsc.edu](mailto:agwinche@bsc.edu)

Meeting Times: TTH 9:30 am – 10:50 am

Location: Olin 201

Office Hours : Monday – 8:00 am – 11:00 am

Wednesday –8:00 am – 11:00 am

(Or email for an appointment)

**Course Website**

All course information will be posted on Moodle including assignments, readings, quizzes, and other important dates. Please be sure to check your courses on Moodle frequently to keep up with due dates and notes.

**Texts**

N/A – Notes will be provided.

Extra resources will also be posted on Moodle. These are for your benefit and can help explain concepts being covered from other perspectives.

**Tentative Course Outline/Important Dates**

Outline is subject to change.

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **Topic** | **Assignments (to be completed after class)** | **Important Dates** |
| Week One: 8/24 – 8/26 | Discussion of Course  Syllabus  Introduction to Robotics |  |  |
| Week Two: 8/29 – 9/2 | The Anatomy of the Robot | Assignment #1 |  |
| Week Three: 9/5 – 9/9 | Discussion of Robotic Code. |  | **9/5 – No Class**  **9/7 – Last day to add a class** |
| Week Four: 9/12 – 9/16 | Intro to Hardware |  |  |
| Week Five: 9/19 – 9/23 | TinkerCad Designs | Assignment #2 |  |
| Week Six: 9/26 – 9/30 |  |  | 9/21 – Last day to drop without a grade |
| Week Seven: 10/3 – 10/7 | TinkerCad Designs |  | 10/6 – 10/9 – Fall Break |
| Week Eight: 10/10 – 10/14 | Sensors on  **Mid-Term Exam** | Assignment #3 | 10/12 – Last day to drop with a “W” |
| Week Nine: 10/17 – 10/21 | Sensors (continued) |  |  |
| Week Ten: 10/24 – 10/28 | Actuators |  |  |
| Week Eleven: 10/31-11/4 | Hardware discussion | Assignment #4 |  |
| Week Twelve: 11/7 -11/11 | Hardware discussion |  |  |
| Week Thirteen: 11/14 -11/18 | Motors | Final Assignment |  |
| Week Fourteen: 11/21 -11/25 | Motors (continued) |  | 11/23 – 11/27 – Thanksgiving Break |
| Week Fifteen: 11/28 -11/30 | Controls |  | 11/30 – Last day of classes |
| 12/2 | **Final Project Due** |  |  |

**Major Assignments**

* Essay discussing safety with robots (benefits/risks)
* 6 TinkerCad Assignments
* 4 assignments dealing with robot manipulation
* Final project

**Assessment**

Assignments 60%

Final Project 30%

Essay (Safety with Robots) 10%

**Major/Program Learning Outcomes**

At the conclusion of the semester, students will be able to

1. Organize and Manipulate data
2. Write code for computational problems
3. Optimize alternative computational approaches for enhancing the creation and presentation of raw material

|  |  |
| --- | --- |
| **Course Outcomes** | **Assessment Methods/Metrics** |
| Students will learn coding as it relates to the application of robotics. | Students will create simulations of circuitry using the online platform of TinkerCad. |
| Students will learn how software drives the components of a robot. | Students will program robotic cars to perform certain tasks that is specified within assignments. |
| Students will learn the relationship between circuitry and programming. | Students will write programs that reflect certain functionality within a robot car. |
| Students will learn safety when working with large robust machines (robotics). | The students will have an assignment to discuss safety in an essay. |

# Getting Started with this Course:

**Moodle Learning Management System**

Students are responsible for checking Moodle for course readings, assignments, and announcements. ***No late assignments will be accepted.*** Any assignments not submitted because of not checking Moodle is the responsibility of the student. Students are also required to check grades on Moodle to verify that the correct grades are recorded for completed work.

It is expected ***all written assignments be saved and submitted on Moodle as a PDF and a .py file.***

## Logging into Moodle

Birmingham-Southern College uses the Moodle Learning Management System (LMS). To get

started with the course, do the following:

1. Log onto the BSC access point by going to: moodle.bsc.edu.
2. Enter your BSC username and password.
3. The Moodle dashboard will open, and your courses will be displayed in the middle of the

screen.

1. Select your course to begin.
2. The course welcome page will open. Read the welcome section and follow the

instructions for getting started.

You will need your BSC User Name and Password to log in to the course. If you do not have or

don’t know your User Name, contact the IT Help Desk at 205-226-3039 or [helpdesk@bsc.edu.](mailto:helpdesk@bsc.edu)

**Programming Assignments**

Programming assignments must provide user with clear instructions for testing of the code. Use of the web is limited to gaining understanding of concepts, examples of topics and use of concepts. Direct re-transcribing/copy and pasting of answers of the code is unacceptable.

**All programming assignments will be submitted through Moodle.** All instructions regarding submission format will be on Moodle. Assignments not following the protocol stated on Moodle **will not be graded**. As stated earlier, ***no late assignments will be accepted.*** Please do not email any assignments.

I reserve the right to ask questions about the program you have developed. This is to verify your understanding.

**Programming Rubric**

|  |  |
| --- | --- |
| Category | Points |
| Primary concept being evaluated (input/output, variable, conversions, decision statements, loops) | 30 |
| Program runs without an error (Simulations complete tasks) | 30 |
| Prompts are clear (user knows what to do once program starts) | 15 |
| Program runs as problems dictates | 15 |
| Program is well Commented | 10 |

**Course & College Policies:**

**Attendance**

Please attend meetings as scheduled and complete work as assigned.

**Assignments**

Assignments will be due as posted on Moodle. All instructions regarding submission format will be on Moodle. Assignments not following the protocol stated on Moodle ***will not*** be graded. As stated earlier, ***no late assignments will be accepted.***

**While use of an online textbook or searching for syntax is permitted, searching for explicit answers to problems is prohibited.**

**Academic Integrity**

Always adhere to the honor code: As a member of the student body of Birmingham- Southern College, I recognize my responsibility to the traditions of the institution, to my fellow students and to myself. I recognize the significance of the honor system. I pledge that I have read and understand the Constitution of the Honor Council, including the Honor Code, and agree to be bound by its provisions.

Some of the work in this class will be collaborative in nature so it is expected that you will discuss assignments with your classmates. However, when you turn in work as your own, please be certain that what you have submitted is your understanding of the concept and not simply copied from another source. You must properly cite and reference all sources. If you are unsure how to do this properly, please reach out to me. If you are found in violation of the Honor Code by the Honor Council, you will receive no credit for the assignment, test, or quiz in question.

Additional information on the honor code and violations can be found in the Birmingham-

[Southern Student Handbook](https://bsc.edu/campus/studev/images/Student-Handbook-2019-2020.pdf) and on the BSC website.

**Netiquette**

1. Check your email often--this is the method the instructor will use most often to communicate with you.
2. Adhere to the same standards in your digital communications as you would for traditional written language.
3. Use clear and concise language.
4. Remember that all college level communication should have correct spelling and grammar.
5. Be cautious when using humor or sarcasm as tone can be lost in an email or discussion post.
6. Using all capitals is the equivalent of SHOUTING and considered RUDE.

**Student Grievance Policy**

Students should follow the complaint process as outlined in the current [Birmingham-Southern College Student Handbook.](https://www.bsc.edu/campus/studev/student-handbook/46/)

## Accessibility/ Americans with Disabilities Act

Students with a disability that qualify under the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act and require accommodations should be registered with BSC’s Accessibility Office. If you are registered for academic accommodation, please make an appointment with me as soon as possible to discuss any accommodation that may be necessary. During this discussion you are not expected to disclose any details concerning your disability though you may do so at your discretion. If you have a disability but have not yet registered, please contact Dr. Sandra Foster, Assistant Director of Accessibility Services and Resources, at 205-226-7909 (x1909) or [smfoster@bsc.edu](mailto:smfoster@bsc.edu), or visit Norton 228. Keep in mind that no accommodation will be made unless and until the instructor receives official notification from the College.

## Statement of Inclusion & Equity

CAC 240 supports an inclusive learning environment where diverse perspectives are recognized and respected. As outlined in the Birmingham-Southern mission, the College challenges students to engage in their community and the greater world, to examine diverse perspectives, and to live with integrity.

## Title IX

Birmingham-Southern College is committed to the creation and maintenance of a safe and healthy learning environment for students and the campus community. The College forbids any type of sexual or gender-based misconduct among its students, faculty, and staff. The College encourages all members of the academic community to report suspected sexual and gender-based misconduct to the appropriate authorities so that it can be investigated, remedied, and eliminated. BSC forbids retaliation against any person who has opposed, reported, or participated in an investigation concerning sexual or gender-based misconduct. See the BSC Title IX website ([www.bsc.edu/titleix](http://www.bsc.edu/titleix)) for more information, including a link to file an online report form and information about how and to whom to report in person. If you or a peer have experienced such misconduct, the Title IX webpage also includes information about the numerous resources available on campus and in the local community with whom the College encourages you to seek support. Confidential resources include counseling and health care providers, our Chaplain, and numerous faculty and staff members who are trained in assisting students by answering questions and helping them navigate their choices in seeking further support and the reporting process.

## Inclement Weather

Inclement weather or other events beyond the control of the College that might cause risk or danger to students, faculty, and staff may occasionally result in changes to normal College operations, including cancellation of classes or events; the calendar schedule may be adjusted.

**BSC Resources for Writers and Readers**

Located in Humanities 102, the Writing Center offers in-person and virtual peer-to-peer tutoring and a quiet, supportive lab space to work on writing assignments. The Writing Center’s tutors are students from a wide variety of majors on campus and have the range to address student writing needs with discipline specificity. Supervised and assisted by Writing Center directors, our tutors provide one-on-one consultations for any student at any point in the writing process. During these consultations, tutors do not “edit” papers; instead, they assist students in addressing any potential writing issues, including content development, grammar usage, and citation formatting. Each tutorial is about 30 minutes long, free of charge, and available on a drop-in basis. There is no limit to how many tutorials a student may attend. Once logged in, a director will take your information and pair you with a tutor for your 30-minute tutorial.

The Writing Center is open Sunday-Thursday, 2pm-8pm. To ensure a full 30-minute tutorial time slot, students are encouraged to be mindful of assignment-heavy weeks, keep track of due dates, and visit the Writing Center at their earliest availability during open hours. Please contact Dr. Anna Williams or Laura Tolbert ([writingcenter@bsc.edu](mailto:writingcenter@bsc.edu)) with any questions or requests for virtual appointments.

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