**Course Outline**

**Carleton University, School of Computer Science**

**COMP 4900c - Advanced Topics in Computer Science:**

**Drone System Software**

**Winter 2020**

Instructor: Ahmad Traboulsi

Classroom: University Centre Room 182

Class Times: Tuesday and Thursday 8:35 PM - 9:55 PM

Office hours: By appointment only.

Email: ahmadtraboulsi@cmail.carleton.ca

**Course Description**

The course aims to introduce the concepts of a quadcopter modelling and control. We will derive the model of a quadcopter. It covers the theoretical (mathematical principles) aspect of a quadcopter modelling. We will develop a broad understanding on how quadcopters fly and operate. We will look and develop basic understanding of a flight controller for the Parrot mambo mini drone. Moreover, the course will cover the DSMX communication protocol which is a protocol to communicate between the transmitter and the UAV. A very basic introduction to motion planning and formation control will be developed in the second part of the term.

**Topics Covered**

* Drone Dynamics
* Drone Communication Protocol (DSMX)
* Flight Formation
* Motion Planning

**Prerequisites**

COMP3000.

**Course Objectives**

At the end of this course, you will:

* Understand the dynamics of a quadcopter.
* Understand a quadcopter mathematical model
* Establish an understanding of the basic concepts of a drone controller
* Understand the DSMX communication protocol used in some drones.
* Understand how the hacking of the DSMx Drone RC protocol could be done with some introduction to GNUradio.
* Understand formation based on potential functions
* Establish basic understanding of Motion planning techniques
* Know about the research topics related to the field

**Evaluation**

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| --- | --- | --- |
| **Component** | **Weight** | **Due Date** |
| Exercises | 40 | weekly |
| Project proposal presentation | 5 | Feb. 25 |
| Project demo | 5 | April. 9 |
| Project report | 50 | April. 12 |

**Attendance**

Class attendance is very important, as students will be responsible for all items discussed in class.

**University Policies**

**Student Academic Integrity Policy**

Every student should be familiar with the Carleton University student academic integrity policy. A student found in violation of academic integrity standards may be awarded penalties which range from a reprimand to receiving a grade of F in the course or even being expelled from the program or University. Some examples of offences are: plagiarism and unauthorized co-operation or collaboration. Information on this policy may be found in the Undergraduate Calendar.

**Plagiarism**

As defined by Senate, "plagiarism is presenting, whether intentional or not, the ideas, expression of ideas or work of others as one's own". Reported offences will be reviewed by the office of the Dean of Science.

**Unauthorized Co-operation or Collaboration**

Senate policy states that "to ensure fairness and equity in assessment of term work, students shall not co-operate or collaborate in the completion of an academic assignment, in whole or in part, when the instructor has indicated that the assignment is to be completed on an individual basis". Please refer to the course outline statement or the instructor concerning this issue.

**Academic Accommodations for Students with Disabilities**

The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (if applicable) at http://www2.carleton.ca/pmc/new-and-current-students/dates-and-deadlines

**Religious Obligation**

Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://www2.carleton.ca/equity/

**Pregnancy Obligation**

Write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: http://www2.carleton.ca/equity/

**Medical Certificate**

The following is a link to the official medical certificate accepted by Carleton University for the deferral of final examinations or assignments in undergraduate courses. To access the form, please go to http://www.carleton.ca/registrar/forms