



ITEC-5000
Analytical Methods for Information Technology
Fall 2018

Instructor: Ali Arya
Office: CB-4202
Office Hours: Monday, 13:00-14:00
Lecture: Friday, 11:30-14:30
Location: Loeb Building A204
Contact: arya@carleton.ca

Course Description

Analytical techniques for algorithms, data structures, statistical analysis methods for IT problems, research methods, and research writing. Three main areas to cover are:

- Systems
 - Information Technology, Systems, and Science
- Software
 - Algorithms, Data vs. Code, and Software Projects
- Research
 - Problem-solving, Design, Experimentation, and Documentation

Course Objectives

- Understand the basic concepts in IT (such as hardware and software technologies, process models, etc)
- Understand the basic concepts in software development (such as algorithms, programming language, etc)
- Design simple software and hardware solutions
- Manage small IT projects
- Plan research projects for IT solutions
- Perform experimentation on IT projects
- Communicate research, design, and development results
- Use common tools for IT design, development, and research

Reference Material

- *Principles of Information Systems*, Stair and Reynolds, Course Technology, 2017
- *Science of Digital Media*, Jennifer Burg, Pearson, 2009
- *Video Games and Interactive Media*, Stephane Natkin, AK Peters, 2006

- *Computer Programming for Beginners: Fundamentals of Programming Terms and Concepts*, Nathan Clark, CreativeSpace, 2018
- *Introduction to Programming Languages*, Arvind Kumar Bansal, CRC, 2013
- *Software Engineering*, Ian Sommerville, Pearson, 2015
- *Software Project Management in Practice*, Pankaj Jalote, Pearson, 2016
- *Experimentation in Software Engineering*, Wohlin and Runeson, Springer, 2012
- *Research Design*, John Creswell, SAGE, 2014
- *Research Methods in Human-Computer Interaction*, Jonathan Lazar, Wiley, 2010
- Various papers and online resources

Grading

Grading Component	%
Project (four reports of equal value)	40
Assignments (five tasks)	40
Class Participation (seminar, reflection, and discussion)	20

Notes:

- Students have to form groups for projects. Topic is selected by students and approved by the instructor, related to the given areas. There will be peer evaluation for project as a scaling factor for group mark.
- Students must achieve a minimum grade of 50% on the final project and overall to pass the course.
- A graduate course requires B- or more to count as required credit in the program.

Detailed Topics and Schedule

- 1: Introduction to Information Technology (Sep 7)
 - Hardware, Software, Data, People, Procedures
- 2: Information Processing (Sep 14)
 - Fundamental Properties of Digital Media
 - Platforms, Interaction, Communication
 - Entertainment, Education, Health
- 3: Introduction to Software Development (Sep 21, two weeks)
 - Software Programs and Algorithms
 - Programming Languages
- 4: Software Projects (Oct 5)
 - Software Life Cycle
 - Process Models
- 5: Software Design (Oct 12)
 - System Analysis, Algorithms, and Architectures
 - Design Patterns and Paradigms
- 6: Evaluation and Experimentation (Oct 19)
 - Software Testing, Verification vs. Validation
 - Experimental Methods, Hypothesis Testing

- 7: Research Design (Nov 2, two weeks)
 - Problem Statement, Research Questions,
 - Literature Review
 - Research Methods
- 8: Projects and Presentations (Nov 16, three weeks)

Note:

- No class on Oct 26 (Fall Break)
- No class on Dec 7 (Monday schedule)
- Assignments will be given for topics 2, 3, 5, 6, and 7.
 - All assignments are given at the start of the related topic and are due in 2 weeks.
- While every attempt will be made to keep to the schedule listed above, circumstances may necessitate modifications throughout the semester.

Inability to Complete an Assignment or Write the Midterm due to Illness

Students who are not able to contribute to a group project, or submit an individual assignment, due to a certified illness will have extensions to perform the tasks. Other arrangements (such as extended deadline or alternative assignments/projects) may be possible upon the request from student and approval by the instructor.

Group work

Due to the nature of the course, final projects have to be done in groups of 2-4. Assignments and seminars are individual to make sure each person will have the opportunity to learn those specific skills. Seminars can be done in groups in special cases, upon request by students and approval of the instructor.

Medical certificate

Please note that in all occasions that call for a medical certificate you must use or furnish the information demanded in the standard university form. <http://www1.carleton.ca/registrar/forms/>

Persons with disabilities

Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities (PMC) for a formal evaluation of disability-related needs. Documented disabilities could include but are not limited to mobility/physical impairments, specific Learning Disabilities (LD), psychiatric/psychological disabilities, sensory disabilities, Attention Deficit Hyperactivity Disorder (ADHD), and chronic medical conditions. Registered PMC students are required to contact the PMC, 613-520-6608, every term to ensure that I receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you only require accommodations for your formally scheduled exam(s) in this course, please

submit your request for accommodations to PMC by the deadlines published on the [PMC website](http://www.carleton.ca/pmc/). (<http://www.carleton.ca/pmc/>)

Religious observance

Students requesting academic accommodation on the basis of religious observance should make a formal, written request to the instructor for alternate dates and/or means of satisfying academic requirements. Such requests should be made during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist, but no later than two weeks before the compulsory academic event. Accommodation is to be worked out directly and on an individual basis between the student and the instructor. Instructor will make accommodations in a way that avoids academic disadvantage to the student. Students or instructors who have questions or want to confirm accommodation eligibility of a religious event or practice may refer to the Equity Services website for a list of holy days and Carleton's Academic Accommodation policies, or may contact an Equity Services Advisor in the Equity Services Department for assistance

Pregnancy

Pregnant students requiring academic accommodations are encouraged to contact an Equity Advisor in Equity Services to complete a letter of accommodation. The student must then make an appointment to discuss her needs with the instructor at least two weeks prior to the first academic event in which it is anticipated the accommodation will be required.

Plagiarism

The University Senate defines plagiarism in the regulations on instructional offenses as: "to use and pass off as one's own idea or product work of another without expressly giving credit to another."

Borrowing someone else's answers, unauthorized possession of tests or answers to tests, or possession of material designed in answering exam questions, are also subject to university policy regarding instructional offences. For more information on Carleton University's Academic Integrity Policy, consult:

<http://www1.carleton.ca/studentaffairs/academic-integrity/>

Course Sharing Websites

Student or professor materials created for this course (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the author(s). They are intended for personal use and may not be reproduced or redistributed without prior written consent of the author(s).

Important Dates to Remember – Academic Year

<https://calendar.carleton.ca/academicyear/>

University Regulations

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/> and <http://calendar.carleton.ca/undergrad/regulations/academicregulationsandrequirementsforthebachelorofinformationtechnologydegree/>