# UNIVERSITY OF BALAMAND

Faculty of: Engineering

Department: Civil Engineering

## COURSE SYLLABUS

### SECTION I: Course Information and Learning Outcomes

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|---|---|
| **Course Name** | Technical Platform Computing For Civil Engineering |

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|---|---|---|---|
| **Course Code:** | CIVE 322 | **Nb. of Credits:** | 2 |
| **Section:** | 1 | **Pre-Requisites:** | many (see catalogue) |

**Instructor Name/Title:** Nabil Fares, PhD
**Office:** EC-220 **Tel/Ext:** x5831 **Email:** nabil.fares@balamand.edu.lb
**Office Hours:** M. W. 11:00 am - 1:30 pm

**Coordinator** Nabil Fares, PhD

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|---|---|---|---|
| **Course time:** | T. Th. 11:00 am - 12:30 pm | **Rm:** | EC-011 |

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|---|---|---|---|
| **Academic** | 2019 - 2020 | **Semester** | Spring |

**Course Description:**
This course develops computing skills using the technical computing platform Mathematica. Topics include: introduction to Mathematica, symbolics, numerics, graphics, animations, programming, document organization and typesetting. Applications to statics, dynamics, engineering mechanics, fluid mechanics and other engineering related courses. Emphasis on ability to plan solutions to technical problems then execute and prepare organized technical reports including tables, figures and illustrations.

**Learning Outcomes:**

- Learn the basics of Mathematica
- Prepare tables, figures, plots and animations of types used in engineering and science studies.
- Do basic linear algebra operations of the type used in fluid and solid mechanics.
- Numerically solve some non-linear systems of polynomial and non-polynomial equations. Solve optimization problems.
- Do basic calculus operations including numerical or symbolic line, area and volume integrals, derivatives and related operations.
- Write simple programs that solve basic problems taken from lab work (curve fitting), statics, dynamics, engineering mechanics and fluid mechanics.

Note: The technical computing software platform used for this course is Mathematica by Wolfram Research.

**Required Textbook:**

- "An Engineer's Guide to Mathematica" by Edward B Magrab, Wiley 2014
- Course notes provided by instructor and are available through Moodle (course notes 2 parts and lecture notes).

## SECTION II: Course Content and Timetable

| Date | Topic |
|---|---|
| Jan 21, 23 | Introduction and basic skills: using online help, basic arithmetic, notebook organization |
| Jan 28, 30 | Assignments, functions of one or more variables. Lists and matrices |
| Feb 4 | Tabulations, animations and basic plotting. |
| Feb 6 | Intro to Mathematica programming: expressions, patterns and rules. |
| Feb 11, 13, 18 | Intro to Mathematica programming (cont): branching, loops, anonymous functions, etc. |
| Feb 20, 25, 27 | continued and review |
| Mar 3 | **TEST 1** |
| Mar 5, 10 | Roots of equations: Solving linear and nonlinear equations (one or more equations) |
| Mar 10, 12 | Linear algebra: Constructing vectors and matrices; Solving linear equations |
| Mar 17, 19 | Discrete data: Plotting and tabulating discrete data |
| Mar 24, 26, 31 | Discrete data: Interpolation of data (1-D, 2-D) |
| Apr 2 | **TEST 2** |
| Apr 7, (9, 14, 16 Easter) | Calculus (1): integrals, derivatives and series |
| Apr 21, 23 | Calculus (2): integrals, derivatives and series |
| Apr 28 | Differential equations (1): Systems of ordinary differential equations (ODEs) |
| Apr 30 | **TEST 2** |
| May 5 | Differential equations (2): Systems of ordinary differential equations (ODEs) |
| May 7 | Graphics programming: graphic primitives with applications |

## Teaching Strategy and Guidelines

- Attend classes, read the associated notes, do examples and study in a group when possible
- Practice, practice, practice but also have fun doing it.

## Student Work Evaluation

| Exam | % of total | Date |
|---|---|---|
| Test 1 | 33% | Mar 3 ; 11:00 - 12:30; EC-011 |
| Test 2 | 33% | Apr 2 ; 11:00 - 12:30; EC-011 |
| Test 3 | 34% | Apr 30 ; 11:00 - 12:30; EC-011 |

• Alternative formulas:
☛ 0.40 * highest test + 0.20 * lowest test + 0.40 * mid test
Note:
☛ Test 3 is comprehensive but most material from after test 1

## SECTION III: Policies and Students' Responsibilities

Academic rules and regulations are to be followed according to the policies and guidelines of the University, as laid out in the catalogue (particularly the sections on Attendance and Academic Behavior).

1. Students are expected to attend all classes and laboratory sessions.
2. Absence, whether excused or not, from any class or laboratory session does not excuse students from their responsibility for the work done or for any announcements made during their absence.
3. A student who is near missing one-sixth of the course sessions will be receiving a written warning from the instructor. Once the number of missed sessions reaches one-sixth of the course sessions, the instructor notifies the student in writing and copies the registrar that it is the student's responsibility to officially withdraw from the course before the end of the drop period, otherwise he will earn a **WF** as a final grade for the course.

   If the number of missed sessions accumulates to more than one-sixth after the drop deadline, the student will receive as well a grade of WF.

   A WF grade is counted as a numerical grade of 40 for the course in computing the student's averages.

   **It is expected from the students to carry themselves with the utmost ethical and professional manner during lectures, and among each other.**

   The University of Balamand is committed to a policy of honesty in academic affairs. Examples of conduct for which students may be subject to academic and/or disciplinary penalties including expulsion are:

1. Cheating, whereby non-permissible written, visual, or oral assistance, including that obtained from another student, is utilized on examinations, course assignments, or projects. The unauthorized possession or use of examination or course-related material may also constitute cheating.
2. Plagiarism, whereby another person's work is deliberately used or appropriated without any indication of the source, thereby attempting to convey the impression that such work is the student's own.

   Note: A student who has assisted another student in any of the aforementioned breaches of standards shall be considered equally culpable.

   In case of cheating or plagiarism, the instructor may take appropriate academic action ranging from loss of credit for a specific assignment, examination, or project to removal from the course with grade of 40. Additionally, the instructor may request disciplinary action through the Disciplinary Committee as outlined in the Student Life section.

**Make-Up examination:** Students who miss a regular examination for a valid reason must present their excuse to the Special Programs secretariat (06 – 930250 ext: 3955; special.programs@balamand.edu.lb) maximum 4 days after the test date. The original report must be presented when the student returns to the University. In this case, a make-up test will be assigned which will include all additional material covered until the date of the make-up test. No exceptions to this policy shall be considered.

**Final examinations:** Students who miss a final examination shall receive an incomplete grade (I) if they present a valid excuse as described above. A make-up for the final examination shall be given, in this case, according to the policies of the University, at a time set by the professor, that suits both the professor and the student. This test must be comprehensive of the whole course material. No exceptions to this policy shall be considered.