DESCRIPTION: The course is focused on basic fundamental aspects and advanced concepts in fluid mechanics. The course objective is to provide review of some fundamental topics from undergraduate curriculum that include conservation laws, dynamic similarity and introduction to boundary layer flows. The course then focuses on advanced topics that include detailed boundary layer analysis, jets, turbulence, aerodynamics, airfoils and compressible flows.

PREREQUISITES: Graduate student standing or permission from the instructor

ANTIREQUISITES: None

TOPICS: Module 1 (Weeks 1-6)
- Conservation Laws
  - Mass (Continuity)
  - Momentum (Navier-Stokes)
  - Energy
- Dynamic Similarity
  - Dimensional analysis
  - Similarity laws

Module 2 (Weeks 7-11)
- Boundary layers
  - Flat plate (Laminar and turbulent boundary layers)
  - Curved surfaces (Flow past cylinder and sphere)
  - Two-dimensional jets
- Turbulence
  - Statistical description of turbulent flows
  - Energy cascade and spectra

Module 3 (Weeks 12-13)
- Aerodynamics
  - Airfoils (geometry and lift/drag characteristics)

CONTACT HOURS: 3 lecture hours per week, 2 tutorial/laboratory hours per week, half course


EVALUATION:
- Term test 1: 30% (Tentative: October 8, 2018)
- Term test 2: 30% (Tentative: November 5, 2018)
- Term test 3: 30% (Tentative: December 3, 2018)
- Laboratory: 10% (Labs will be held in SEB-1072)

Term tests are closed book, only standard scientific calculator allowed. Laboratory component is obligatory
for course completion

INSTRUCTOR: Professor R. Khayat
Office: SEB 3086, Tel. 519-661-2111, ext. 88253
Email: rkhayat@uwo.ca
Office Hours: To be announced

ATTENDANCE: Any student who, in the opinion of the instructor, is absent too frequently from class or laboratory periods in any course, will be reported to the Associate Dean (Graduate), after due warning has been given. On the recommendation of the Department concerned, and with the permission of the Associate Dean (Graduate), the student will be debarred from taking the regular examination in the course.

CONDUCT: Students are expected to arrive at lectures on time, and to conduct themselves during class in a professional and respectful manner that is not disruptive to others.

SICKNESS: Students should immediately consult with the instructor or Associate Chair (Graduate) if they have problems that could affect their performance in the course. The student should seek advice from the Instructor or Associate Chair (Graduate) regarding how best to deal with the problem. Failure to notify the Instructor or the Associate Chair (Graduate) immediately (or as soon as possible thereafter) will have a negative effect on any appeal.

ACCESSIBILITY: Please contact the course instructor if you require material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

PLAGIARISM/ACADEMIC OFFENCES: Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage of text from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence. Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/handbook/appeals/scholastic_discipline_grad.pdf

NOTICES: Students are responsible for regularly checking their Western email and notices posted on Instructors' doors.

NOTE: The above topics and outline are subject to adjustments and changes as needed.
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<th>Degree Level Expectation</th>
<th>Weight</th>
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| Depth and breadth of knowledge           | 70%    | Term tests, Lab work| • Understands advanced concepts and theories  
• Aware of important current problems in the field of study  
• Understands computational and/or empirical methodologies to solve related problems |
| Research & scholarship                   |        |                    | • Able to conduct critical evaluation of current advancements in the field of specialization  
• Able to conduct coherent and thorough analyses of complex problems using established techniques/principles and judgment |
| Application of knowledge                 | 30%    | Term tests         | • Able to apply knowledge in a rational way to analyze a particular problem  
• Able to use coherent approach to design a particular engineering system using existing design tools |
| Professional capacity / autonomy         |        |                    | • Aware of academic integrity  
• Implements established procedures and practices in the coursework  
• Defends own ideas and conclusions  
• Integrates reflection into his/her learning process |
| Communication skills                     |        |                    | • Communicates (oral and/or written) ideas, issues, results and conclusions clearly and effectively |
| Awareness of limits of knowledge         |        |                    | • Aware of the need of assumptions in complex scientific analyses and their consequences  
• Understands the difference between theoretical and empirical approaches  
• Acknowledges analytical limitation due to complexity of practical problems |