Calculus

CREDIT	3	INSTRUCTOR	Budimir Rosic
OFFICE		OFFICE HOURS	
TIME	09:00 ~ 10:40	CLASSROOM LOCATION	TBA
E-MAIL	budimir.rosic@eng.ox.ac.uk		

[COURSE INFORMATION]

COURSE DESCRIPTION & GOALS	In this intensive course students will get a comprehensive overview of calculus through a syllabus taught in many universities. The concepts and techniques will be also placed in historical context and also linked through applications and examples to different science fields. The students will learn more about different types of functions, and their characteristics. Limits and derivatives of functions will be followed by differentiation roles and their applications. Sketching of different functions will be practiced. The integration concept will be introduced through examples of distances and areas. Integration rules and their applications, Definite and indefinite integrals. In the last week the student will learn how to solve first order linear differential equations. The course is ambitiously aimed for both science and non-science students.
PREREQUISITE	
COURSE REQUIREMENTS	Internet access for access to lecture notes and material. Calculus, James Stewart
GRADING POLICY	Midterm Exam (50%) Final Exam (50%)
TEXTS & NOTES	The material covered in this course closely follows James Stewart's Calculus book (7^{th} Edition).
INSTRUCTOR'S PROFILE	Budimir Rosic is an Associate Professor in Engineering Science at the University of Oxford in the United Kingdom. He holds a Ph.D. in Aerospace Engineering from the University in Cambridge, where he also worked as a researcher fellow and a college lecturer. His research covers the experimental and computational aerodynamics and heat transfer mainly applied to power generation systems and jet engines. He works closely with major global power generation and jet engine manufacturers. He is also recipient of two ASME Gas Turbine Awards and several ASME TurboExpo best paper awards.

[WEEKLY SCHEDULE]

WEEK (PERIOD)	WEEKLY TOPIC & CONTENTS	COURSE MATERIAL & ASSIGNMENTS	NOTES
1	**Introduction to calculus.** History of calculus, its development and connections to the other sciences. Review of some concepts and tools prerequisite for this course. **Functions** (Concept of a function. Definitions and simple properties of different type of functions.)		
2	**Limits and derivatives of a function** (Tangent and velocity problems. Limit of a function. Concept of continuity. Asymptotes. Derivatives and rates of change. Derivatives of a function.) **Differentiation Rules** (Derivatives of: polynomials, exponential, trigonometric, and logarithmic functions. The product and quotient rules. The Chain rule. Rages of change, exponential growth and decay – application to different sciences.) **Applications of the differentiation** (Maximum and minimum values. The mean value theorem. L'Hospital's Rule. Newton Method.		
3	**The shape of a graph and curve sketching**. (Curve sketching of different types of functions.) **Integrals** (Areas and distances. The definite Integrals. The fundamental theorem of calculus. Indefinite integrals. The substitution rule.)		
4	**Applications of Integration** (Areas between curves. Volumes. Work. Average value of a function.) **Techniques of Integration** (Integration by parts. Trigonometric Integrals and substitution. Integral of rational functions by partial fractions. Approximate integration. Area of a surface of revolution. Application of integration to physics, engineering, economics and biology.		

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5	**Multiple Integrals** (Double integrals over rectangles. Double integrals over general regions. Surface area. Triple integrations. Change of variables in multiple integrals. **Infinite Series** (The geometric series. Power series. Representations of functions as power series. Taylor and Maclaurin Series. Applications of Taylor polynomials.		
6	**Differential Equations** (Different types of differential equations. Modelling with differential equations. First-order linear differential equations.		