

## **Engineering Tripos Part IIA Project, SC2: Bicycle Design, 2019-20**

### **Leader**

[Prof M P F Sutcliffe](#) [1]

### **Timing and Structure**

Please see moodle page for 2020 revised details

### **Prerequisites**

Part I Mechanics, Materials and Structures

### **Aims**

The aims of the course are to:

- To define the specification of various types of bicycle in current use
- To choose suitable materials for a number of components, using the Cambridge Engineering Selector as the principal tool, but also drawing on other sources.
- To investigate in detail one aspect of bicycle design, as listed below.

### **Content**

The project will investigate the mechanical, structural and materials design considerations for the bicycle.

#### **1. Introduction (joint sessions).**

An introductory session will put the bicycle in its historical perspective and discuss the specification of various types of bicycle. Students choose a mini-project for section 3.

#### **2. Specification, Conceptual Design and Use of the Cambridge Engineering Selector (students work alone in week 1).**

All students will receive two handouts. The first will guide the writing of a report on the specification and conceptual design of selected parts of the bicycle and an introduction to their mini-project.

The second handout will lead students through the use of the Cambridge Engineering Selector (CES) to identify suitable materials and help them establish performance indices for a number of key components.

#### **3. Mini-projects (students in pairs).**

Students will undertake a mini-project on one aspect of bicycle design. Mini-projects will be directed through the use of handouts and timetabled supervision. Each student will write a report on their mini-project.

The subjects covered are:

- Optimisation on cost or performance
- Tyre rolling resistance

- Bearing and chain performance
- Fork and frame loading
- Fatigue failure of frames and spokes
- Power matching.

**4. Presentation and Assessment: Each student will make a short presentation of their findings.**

### Coursework

Coursework	Due date	Marks
First report	Wed 13 May 2020	10
CES report	Fri 15 May 2020	10
Presentation	Wed 3 June 2020 (TBC)	10
Mini-project report	Fri 5 June 2020	50

### Examination Guidelines

Please refer to [Form & conduct of the examinations](#) [2].

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### Links

[1] <mailto:mpfs1@cam.ac.uk>

[2] <https://teaching22-23.eng.cam.ac.uk/content/form-conduct-examinations>