

**EXAMPLE Structured Abstract**  
for  
BE 4990: Undergraduate Research in Biological Engineering  
OR  
BE 4995 Honors Thesis Research in Biological Engineering

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Student: Jane Doe

Supervising faculty: Dr. Mark Smith

Title: Flow pattern imaging using shear-sensitive molecular rotors

Semester: Summer 2017 Credit hours: 3

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Summary:

The goal of this project is to generate images of flow patterns in various flow channels and flow chambers. Rather than conventional techniques, such as particle tracking, a novel class of fluorescent molecular rotor characterized by an increase of fluorescent intensity in areas of elevated fluid shear stress will be used. The student will design and fabricate flow chambers, setup and use a precise flow apparatus, and acquire images of each chamber at various flow rates. In addition, the student is responsible for image processing, image analysis, and the quantitative analysis of the results (i.e. analysis of computed flow *versus* intensity).

Engineering content:

The student will design a suitable flow chamber including the estimate or computerized simulation of flow behavior to achieve geometries that can easily be analyzed. The design component (flow chambers, precision flow system, fluorescent image acquisition system) is an important part of the engineering content.

The study of fluid dynamics (including computed fluid dynamics) is a traditional engineering science. Data will be taken via image techniques and analyzed to determine the validity of the design and suggest improvements to optimize the system.

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Approved by: (printed and signature) John Naismith

Approved by: (printed and signature) Betty Shay

The abstract is needed to show the **engineering content (engineering science and engineering design)** that will be gained from the student experience.

Engineering Topics – engineering science and engineering design defined.

**Engineering sciences** have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other.

**Engineering design** is the process of devising a systems, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

- from ABET–EAC Criteria for Accrediting Engineering Programs, E1 5/25/06