

UCLA Engineering

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To: Professor Jeff Eldredge, FEC Chair

From: Richard Korf, Vice Chair for Undergraduate Programs, Computer Science Department
Adnan Darwiche, Chair of Computer Science Department

Richard F. Korf
Adnan Darwiche

Date: November 22, 2017

Re: CS and CS&E Course Creation CS M186LS, Request for Approval

We propose the creation of the new course, Computer Science M186LS. We request that these changes take effect for Spring 2018.

Regarding Computer Science M186LS:

This new course follows a novel minimal-math approach, providing a biosystems modeling course for relatively math-poor students who want or need to develop skills in explicit modeling of dynamic biological systems.

Systems modeling skills are usually developed in engineering courses at the upper division level, typically following two years of lower division math. Much of the conceptual framework for systems modeling, however, is structure-object-connection oriented, and can be extracted isomorphically or homeomorphically from the biology, using diagramming and graphing tools, providing structured models using little or no mathematics – as a first step.

Professor DiStefano's current CM186 course requires learning math concepts beyond what is covered in the math series taken by students in Bioengineering, Computer Science & other engineering departments. Nearly all students in life science departments lack the needed math skills to comprehend the material because they take few math courses as part of their major. Professor DiStefano has learned this well, having taught CM186 for many years to mixed classes of upper division students primarily from Engineering and Computer Science departments. Students successfully completing CM186/286 typically have more applied math, including intermediate linear algebra (Math 115), systems and signals (EE102) and/or feedback and control systems (e.g. EE141). Engineers who have taken only 6 quarters of required Calculus are typically challenged by the systems, signals and transform methods introduced (not in depth) in the course, the basic methodology of the modeling methodologies that underlie the course focus. This is a weakness of 186/286 and part of the motivation for the new 186LS course - which circumvents the need for mathematical depth by focusing on structural modeling concepts, ultimately morphing into differential equations of biosystems -- node by node -- from the biology -- a novel animation approach that Professor DiStefano is currently developing for this pedagogy.

More than half of the new course is focused on structural and diagramming methods drawn from engineering systems and control paradigms. We believe this approach is quite novel,

with a new textbook to support it. We also anticipate that M186LS will have a large following once it's established, as no other related courses are planned and M186LS is unique. Professor DiStefano inquired about acceptable suffixes, and LS was deemed appropriate as it can be interpreted as "Life Sciences." This course is indeed meant to attract Life Science students, as well as Engineering and Computer Science students interested in modeling dynamic biosystems in the life sciences.

We will later propose that the course become part of the Bioinformatics minor (discussed with E. Eskin), the Computational & Systems Biology Major (Van Savage), and at least an elective course for undergraduates in CS & Bioengineering. Additionally, this course has been approved by the Computer Science departmental Academic Policy Committee for proposal.

We appreciate your kind consideration.