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From: ITM Web Curriculum Subcommittee (Stolley, Hajek, Bailey)

To: ITM Curriculum Committee

Subj: Report and Recommendations for the ITM Web Curriculum - Part 1

The work of the ITM Web Curriculum Subcommittee has been to revitalize ITM's web offerings to be a truly distinctive area of specialization within ITM. The committee has operated with the vision of growing the undergraduate and graduate student body enrolling at Illinois Tech to specialize in web design and development, and to making Illinois Tech known within the city and region as a leader in educating the next generation of web designers and developers.

The ITM Degrees and certifications relating to Software Development were born at the turn of the century - a time when the web as we know it was being born. Technologies such as HTML and JavaScript were in their nascent stage, and are used in a vastly different capacity today. The predominant programming methodologies of C++ and Java were not designed for the current mobile and web based internet we know today.

Courses covering these newer technologies and paradigms were added to the ITM degree as they were created and evolved; JavaScript frameworks, DOM advancements, CSS, Full-Stack development and so forth. The ITMD based degrees and specializations, Software Development and Web Design and Application Development, are now two related but distinct categories. The most recent revisions to these degrees and related specializations were made in the early part of 2010 decade and are in need of shepherding and steering from the department and faculty. There has been significant technological changes since their inception and we believe that the suggested changes reflect the current and the future state of technology.

For the last ten months, the Web Curriculum Subcommittee has worked on three primary, related fronts:

a) **Updating web courses for the *Bulletins*.** This has included revising course descriptions, where necessary; revising course prerequisites; and adding new courses that have previously been offered as topics classes. In this document, Part 1 of our report, we will present the updated web courses for the *Bulletins*.

b) **Updating the web concentrations.** Students can currently complete web concentrations (the undergraduate specialization or minor; the graduate specialization or certificate) with a majority of their courses outside of the web curriculum. Additionally, important new courses in the web curriculum are missing from the lists of specializations and both the undergraduate and graduate level. This will be covered in Part 2 of our report.

c) **Considering a new course designation, ITMW, for web courses.** The ITMD designation is arguably overloaded. An ITMW designation would a) distinguish web design and development offerings from other development courses and b) provide greater flexibility for course numbering, especially for sequential courses (a problem in the 460s) and for parallel graduate and undergraduate offerings. This will be covered in Part 2 of our report.

1. Proposed Course Titles and Descriptions for the *Undergraduate and Graduate Bulletins.*

   a) Updates to Current Course Descriptions and Prerequisites

   ITMD 361
   This course covers the creation and deployment of modern, standards-compliant web pages written in HTML, CSS, and JavaScript in the context of the client-server architecture of the web. Students create and deploy a website with multiple, structured pages cross-linked by a site navigation structure.
   LECTURE: 3 LAB: 0 CREDITS: 3

   ITMD 362
   Students in this course will learn the importance of human-computer interaction design and the effectiveness of user-centered design. The course will cover a survey of methods frequently used in the HCI profession, such as usability testing and prototyping, as well as general design principles and the use design guidelines. A particular emphasis will be placed on usability for website engineering. Students will apply knowledge from the field in the design and construction of user-centered websites.
   PREREQUISITE(S): ITMD 361; LECTURE: 3 LAB: 0 CREDITS: 3

The ITMD 467/567 Web Systems Integration course will remain unchanged as our Web Sequence capstone course, but will be renumbered to ITMD 447/547.

b) Updates to the existing 46x/56x Web Sequence: the new ITMD 44x/54x Web Sequence

The subcommittee has spent considerable effort revamping the 46x/56x web sequence, which has languished since what was ITM 461 became ITMD 361, leaving three vaguely named and described classes—"Web Site Application Development," "Intermediate Web Site Application Development," and "Advanced Web Site Application Development" as 462, 463, and 464 respectively—and a fourth class that actually is taught regularly, and referred to as "The JavaScript Class" by many students. Because we cannot assign new courses to existing course numbers, this sequence must be renumbered in order to allow a consistent, sequential presentation of course numbers; the X4X number series in ITMD is available for this purpose, and already contains one course in the series, ITMD 545 Web RTC. "The JavaScript Class" will be rebilled as ITMD 441, and other courses are renamed, renumbered, and reorganized to give coherence to the program and promote student specializations in web at both the undergraduate and graduate level.

ITMD 441: Web Application Foundations
In this course students examine core web technologies that are integral in the creation of web-based applications typically delivered in a browser. The course will cover technologies including fundamental web protocols, web application architectures, markup, and scripting languages. A focus will be placed on learning to write modern, standards-compliant JavaScript and how it is used to interact with HTML and CSS to enable rich user interfaces and communication with other services. Current frameworks, libraries, and tools will also be explored.
PREREQUISITE(S): ITMD 362; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 442: Full-Stack Web Development
This course covers the fundamental concepts and techniques of full-stack web development, focusing on server-delivered front-end content such as HTML or JSON and its integration with back-end architectures and data stores.
PREREQUISITE(S): ITMD 441; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 443: Front-End Web Development
This course emphasizes front-end, browser-based components of web application development. It includes a robust survey of Web APIs in addition to advanced coverage of visual design executed in leading-edge CSS.
PREREQUISITE(S): ITMD 442; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 444: Back-End Web Development
This course emphasizes back-end, server-side components of web application development. It provides broad coverage of server-side data stores and languages, and surveys multiple leading server-side web development frameworks.
PREREQUISITE(S): ITMD 442; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 449: Topics in Web Development
This course will cover a particular topic in web development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 449/549 credit may be applied to a degree.
CREDIT: Variable

ITMD 541: Web Application Foundations
In this course students examine core web technologies that are integral in the creation of web-based applications typically delivered in a browser. The course will cover technologies including fundamental web protocols, web application architectures, markup, and scripting languages. A focus will be placed on learning to write modern, standards-compliant JavaScript and how it is used to interact with HTML and CSS to enable rich user interfaces and communication with other services. Current frameworks, libraries, and tools will also be explored.
LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 542: Full-Stack Web Development
This course covers the fundamental concepts and techniques of full-stack web development, focusing on server-delivered front-end content such as HTML or JSON and its integration with back-end architectures and data stores.
PREREQUISITE(S): ITMD 441 or ITMD 541 ; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 543: Front-End Web Development:
This course emphasizes front-end, browser-based components of web application development. It includes a robust survey of Web APIs in addition to advanced coverage of visual design executed in leading-edge CSS.
PREREQUISITE(S): ITMD 442 or ITMD 542; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 544: Back-End Web Development
This course emphasizes back-end, server-side components of web application development. It provides broad coverage of server-side data stores and languages, and surveys multiple leading server-side web development frameworks.
PREREQUISITE(S): ITMD 442 or ITMD 542; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 545: Web Real-Time Communications
This course covers the WebRTC specification's set of protocols, architectures, and APIs designed to enable browser-to-browser real-time communication of voice, video, and data. Students will learn to apply basic technologies including WebSockets, HTTP, HTML5, Web Sockets, NAT, STUN, TURN, and ICE to ensure two-way real-time communication. Students will use JavaScript and development environments to create basic data and media applications based on the WebRTC technologies and will analyze the impact of their applications on the performance and behavior of the networks that carry them.
PREREQUISITE(S): ITMD 541; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 549: Topics in Web Development
This course will cover a particular topic in web development, varying from semester to semester, in which there is particular student or staff interest. This course may be taken more than once but only 9 hours of ITMD 569 credit may be applied to a degree.
CREDIT: Variable

c) Other New Courses

ITMD 445: Web Real-Time Communications
This course covers the WebRTC specification's set of protocols, architectures, and APIs designed to enable browser-to-browser real-time communication of voice, video, and data. Students will learn to apply basic technologies including WebSockets, HTTP, HTML5, Web Sockets, NAT, STUN, TURN, and ICE to ensure two-way real-time communication. Students will use JavaScript and development environments to create basic data and media applications based on the WebRTC technologies and will analyze the impact of their applications on the performance and behavior of the networks that carry them.
PREREQUISITE(S): ITMD 441; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 446: Web Microservices and APIs
This course covers fundamental principles and methods for programmatically accessing and parsing data returned by internet-available data APIs. The course guides students in carefully examining the structure of API endpoints expressed as URLs and the conventions of RESTful architecture.
PREREQUISITE(S): ITMD 441; LECTURE: 3 LAB: 0 CREDITS: 3

ITMD 546: Web Microservices and APIs
This course covers fundamental principles and methods for programmatically accessing and parsing data returned by internet-available data APIs. The course guides students in carefully examining the structure of API endpoints expressed as URLs and the conventions of RESTful architecture.
PREREQUISITE(S): ITMD 541; LECTURE: 3 LAB: 0 CREDITS: 3