FITC Institute Final Report
Appendix J

Curriculum Analysis Report:
Florida Agricultural and Mechanical University Information Technology Program

June 9, 2015

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1. Introduction

The Florida IT Career Alliance (FITC) Assessment Project has been tasked with examining the FAMU IT curriculum. This analysis answers one research question: To what extent are the learning outcomes in the FAMU CS program's courses similar to the learning outcomes in the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE) Computer Society (hereafter ACM/IEEE) IT curriculum guidelines?

To answer this question, a syllabus analysis was conducted. Syllabus analysis is a subset of curriculum analysis, a process that is commonly used to illustrate academic program content. At the core of curriculum analysis is course syllabus analysis, an efficient and non-obtrusive means of assessing knowledge and skill sets within a curriculum (Apigian & Gambill, 2008; Madson, Melchert, & Whipp, 2010; Veltri et al., 2011). A course syllabus, which contains information such as course schedules, assignment descriptions, student learning objectives, subject content, and grading criteria, is a "contract" between the instructor and the student, a permanent record for academic institutes, and a reference tool for students (Parkes & Harris, 2002).

2. Method

2.1 Data Collection

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The unit of analysis for this portion of the FITC Assessment Project was an individual course syllabus. In order to remain consistent with the other curricula analyses in the FITC Assessment project, only core IT courses in the FAMU undergraduate IT program were analyzed. The course numbers include:

- COP 3828 Web Programming and Design;
- CIS 1920 Professional Development I;
- CNT 2000 Computer Systems and Network Fundamentals;
- COP 3014C Fundamentals of Programming;
- COP 3710 Database Management System;
- COP 3366 Introduction to C# Programming;
- COT 2104 Mathematics for Computing;
- CIS 4920 Professional Development;
- CIS 4360 Introduction to Computer Security;
- CNT 4504 Data Communication & Organizational Network;
- CIS 4250 Computer Ethics and Professional Responsibility;
- CNT 4603 Computer & Network System Administration;
- CIS 4517 Needs Assessment and Technology Transfer;
- CEN 4721 Concepts and Principles of HCI; and
- CIS 4945 IT Capstone Project.

The most recent course syllabus from each course was collected, resulting in a total of 15 (N=15) syllabi suitable for analysis.

2.2 Data Analysis

Python was employed as a way to automatically extract relevant portions of information from the syllabi and analyze the text. Because the syllabi followed no standardized format, course learning objectives were extracted from any potentially relevant section including the course description, course schedule, course objectives, etc. Once the course learning objectives were extracted, they were automatically compared to the ACM/IEEE IT curriculum guidelines to determine the extent to which the syllabus learning outcomes are similar to the topics in the curriculum guidelines.

The ACM/IEEE curriculum guidelines follow a specific structure. The two organizations jointly determine what should comprise the *Body of Knowledge* for each computing discipline—that is, what each program might include to prepare graduates to work in the industry. The *Body of Knowledge* is then divided into specific *Knowledge Areas.* The 2008 ACM/IEEE IT curriculum guidelines specific 13 distinct *Knowledge Areas*:

- ITF-Information Technology Fundamentals;
- HCI-Human Computer Interaction;
- IAS-Information Assurance and Security;
- IM-Information Management;
- IPT-Integrative Programming and Technologies;

- MS-Math and Statistics for IT;
- NET-Networking;
- PF-Programming Fundamentals;
- PT-Platform Technologies;
- SA-Systems Administration and Maintenance;
- SIA-System Integration & Architecture;
- SP-Social and Professional Issues; and
- WS-Web Technologies.

In turn, each of these *Knowledge Areas* is further broken down into *Knowledge Units,* which are comprised of individual learning outcomes related to that *Knowledge Unit.* Therefore, the course learning outcomes extracted from the 15 (N=15) FAMU IT course syllabi were compared to the *Knowledge Units* in the ACM/IEEE IT *Body of Knowledge*.

The ACM/IEEE 2008 IT curriculum guidelines specify the number of hours each *Knowledge Unit* requires to teach the topics or learning outcomes the *Knowledge Unit* contains. The hours required to cover a topic differ from course credit hours in that they reflect the number of lecture hours dedicated to the topic. According to the ACM/IEEE curriculum guidelines, the number of hours corresponds "to the in-class time required to present the material in a traditional lecture-oriented format" (Lunt et al., 2008, p. 66). For instance, a particular course may be worth three credit hours, but the number of hours needed to cover a *Knowledge Unit* in lecture may be five. The total number of lecture hours for the IT program in the ACM/IEEE guidelines is 318.

The percentage of *Knowledge Unit* coverage for each *Knowledge Area* was determined once the topics or learning outcomes from the syllabi were compared to the learning outcomes specified by the ACM/IEEE curriculum guidelines. As stated previously, learning outcomes were extracted from the syllabi and compared to the learning outcomes under each *Knowledge Unit* in the ACM/IEEE based on keyword matching.

3. Findings

Based on the syllabus analysis, a great deal of similarity between the FAMU IT course learning outcomes and the ACM/IEEE IT curriculum guidelines was observed. It was determined that 12 out of 13 (92.3%) of the *Knowledge Areas* specified in the ACM/IEEE IT curriculum guidelines contained *Knowledge Units* that were more than 60% covered in the FAMU IT syllabi (N=15). There were no instances of a *Knowledge Area* whose *Knowledge Units* were not at least partially covered in the syllabi analyzed.

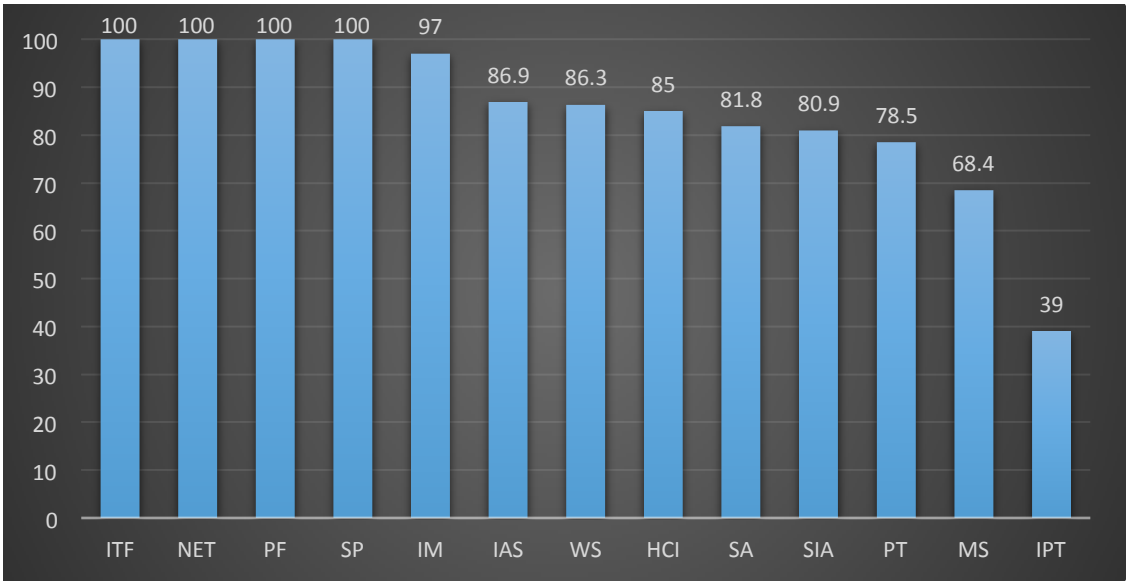

Figure 1: Percentage of ACM/IEEE IT *Knowledge Units* covered in FAMU IT syllabi by *Knowledge Area*

Figure 1 illustrates the percent coverage of *Knowledge Units* in each *Knowledge Area* demonstrated by the FAMU IT course syllabi. Based on the analysis, it has been determined that 100% of the *Knowledge Units* in the *Knowledge Area* Information Technology Fundamentals (ITF) were covered in FAMU syllabi. 85% of the *Knowledge Units* in Human Computer Interaction (HCI) were covered in the syllabi, 86.9% of *Knowledge Units* in the Information Assurance and Security (IAS) *Knowledge Area* were present in the syllabi, 97% of the Information Management (IM) *Knowledge Area's Knowledge Units* were covered, and 39% of the *Knowledge Units* in Integrative Programming and Technologies (IPT) were present in the sample syllabi. Math and Statistics for IT (MS) had 68.4% *Knowledge Unit* coverage, Networking (NET) and Programming fundamentals (PF) both had 100% coverage, and Platform Technologies (PT) had 78.5% coverage. The *Knowledge Areas* Systems Administration and Maintenance (SA), System Integration & Architecture (SIA), Social and Professional Issues (SP), and Web Technologies (WS) demonstrated 81.8%, 80.9%, 100%, and 86.3% *Knowledge Unit* coverage respectively.

4. Discussion

4.1 Findings Discussion

The FITC Assessment Project has been tasked with analyzing several computing programs' course syllabi. This portion of the analysis answered one research question: To what extent are the learning outcomes in the FAMU IT program's courses similar to the learning outcomes in the Association for Computing Machinery (ACM) and the Institute of Electrical and Electronics Engineers (IEEE) Computer Society IT curriculum guidelines?

Based on the analysis of 15 (N=15) core courses' syllabi in the FAMU IT program, it was determined that many of the *Knowledge Areas* specified by the ACM/IEEE IT curriculum

guidelines are well represented in the courses and there is much similarity between the curriculum guidelines developed by the ACM/IEEE and the learning outcomes listed in the FAMU IT course syllabi. Only one Knowledge Area had a percentage of *Knowledge Unit* coverage below 60%. This *Knowledge Area* is Integrative Programming and Technologies (IPT).

In order to determine if these skills conveyed in this *Knowledge Area* are sought by local employers and whether the program's graduates would benefit from additional topic coverage in the curriculum, the results from this analysis should be compared to the results of the job post analysis as well as the findings from the employer interviews.

4.2 Limitations

For the purposes of this analysis, only core courses in the FAMU undergraduate IT program were considered. As the 15 core courses do not comprise a complete curriculum, it is likely that additional learning outcomes are covered in elective courses. Similarly, only syllabi were analyzed. Certain learning objectives and topic areas may be covered in other aspects of the course such as lecture, assignments, etc.

5. Conclusion

Although syllabus analysis is an important aspect of curriculum examination, it is a small portion of a much larger picture. A program's curriculum cannot be fully understood based only on a syllabus analysis. Future research may focus on other aspects of student learning such as course instruction, student internship experience, textbooks, assignments, etc.

Additionally, while curriculum guidelines such as the ones developed by the ACM/IEEE are helpful in designing a comprehensive curriculum, a college program must also respond to other factors such as faculty expertise, community needs, and the needs of the local industry. These factors should be taken into account when examining a curriculum.

References

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