

# The University Senate of Michigan Technological University

## Proposal 31-16

(Voting Units: Academic)

### “New Concentration in **Game Development** within the Bachelor’s Degree in Computer Science”

**1. Date:** March 18, 2016

**2. Proposer:** Scott Kuhl ([kuhl@mtu.edu](mailto:kuhl@mtu.edu)), Associate Professor  
Min Song ([mins@mtu.edu](mailto:mins@mtu.edu)), Chair of Department of Computer Science

**3. Interdisciplinary programs:** NA

#### **4. General Description and Characteristics of program:**

##### **Description**

A bachelor’s degree in Computer Science from Michigan Tech with a Game Development concentration provides students with hands-on game development experience while simultaneously providing a solid computer science background. Graduates of this program will not only know to develop video games and other software---they will also understand how that software works. For example, students will understand the networking details necessary for multiplayer games, the fundamentals of making efficient and compelling artificial intelligence competitors, and how calculate the shading of complex 3D scenes. The concentration will prepare students for careers in fields such as game development, simulation, visualization, software engineering and other computing fields. Compelling games must be both engaging, easy to learn, and easy to play. Therefore, this concentration will also complement courses and departments on campus which focus on human-computer interaction, human factors, and digital art.

**Learning Goals:** The learning goals for graduates of the Computer Science degree program are the following:

- (a) An ability to apply knowledge of computing and mathematics appropriate to the program’s student outcomes and to the discipline
- (b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- (c) An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
- (d) An ability to function effectively on teams to accomplish a common goal
- (e) An understanding of professional, ethical, legal, security and social issues and responsibilities
- (f) An ability to communicate effectively with a range of audiences
- (g) An ability to analyze the local and global impact of computing on individuals, organizations, and society
- (h) Recognition of the need for and an ability to engage in continuing professional development
- (i) An ability to use current techniques, skills, and tools necessary for computing practice.

The requirements of the Computer Science degree program fulfill goals (a)-(i) for all its concentrations. The requirements of the Game Development Concentration, with its focus on Enterprise and hands-on experience with game development, provides extra opportunities for students to exercise these competencies, particularly (d)-(f).

## **5. Rationale:**

As evidenced by the 60+ students who regularly participate in Husky Game Development Enterprise, there is significant interest among the student population to learn about game development. The field is rapidly growing with a flourishing independent game development community focused on creating games for phones, tablets, computers, consoles, and head-mounted displays. Unlike game *design* degree programs, this concentration focuses primarily on game *development*---and aims to prepare students with the core Computer Science and technical skills necessary to develop games. The concentration will also give students hands-on game development experience, teamwork experience, and a basic understanding of non-technical aspects of game development such as sound design and visual art.

We believe that this concentration will complement existing CS degree options while also building on the strengths of the CS department in the areas of computer systems, graphics, and human-computer interaction. There are no details about computer game development in the Bureau of Labor Statistics data concerning occupational projections, but BLS commented that “overall employment in computer and information technology occupations is projected to grow 12 percent from 2014 to 2024, faster than the average for all occupations.” (<http://www.bls.gov/ooh/computer-and-information-technology/home.htm>, publication date 17 December 2015) The overall popularity of independent game development and the continued demand for mobile computing is apparent in a simple internet search for computer gaming. The web site Study.com ([http://study.com/articles/Computer\\_Game\\_Designer\\_Job\\_Description\\_and\\_Info\\_About\\_a\\_Career\\_in\\_Computer\\_Game\\_Design.html](http://study.com/articles/Computer_Game_Designer_Job_Description_and_Info_About_a_Career_in_Computer_Game_Design.html)) lists a number of university with computer game degrees, most of which are less sophisticated and do not include the focus upon game development that stands at the center of this proposal. In addition, this concentration complements entrepreneurial initiatives on campus such as the Enterprise program.

The 123 credits required is in line with our other Computer Science concentrations.

## **6. Related programs:**

- NC State University - B.S. Computer Science - Game Development Concentration  
<http://www.csc.ncsu.edu/academics/undergrad/bs-csc-qdc.php>
- University of Southern California - B.S., Computer Science (Games)  
<https://catalogue.usc.edu/schools/engineering/computer-science/undergraduate/#games>
- University of Wisconsin Stout - B.S., Game Design and Development - Computer Science Concentration  
<http://www.uwstout.edu/programs/bsgdd/>
- Rochester Institute of Technology - B.S. Game Design & Development  
<https://www.rit.edu/gccis/igm/bs-game-design-development-overview>

## **7. Projected enrollment based on current faculty numbers:**

Some students pursuing CS degrees may decide to switch to this concentration. We hope that this Game Development concentration will also help attract more students to the CS program at Michigan Tech. No

new courses are needed for this concentration. No additional teaching resources will be needed to start this degree concentration.

**8. Scheduling plan:** Regular (no evening or extension courses)

**9. Curriculum design:** See attached degree audit form. All CS courses will be used for departmental GPA calculation

**10. New courses:** None

**11. Model schedule:** [See attached flowchart](#)

**12. Library and other learning resources:** \$400 for additional books relating to game development.

**13. Faculty resumes:**

Resumes and CVs for Computer Science faculty are available online at:

<http://www.mtu.edu/cs/department/faculty/>

**14. Description of available/needed equipment:** No new equipment is needed. The concentration will be supported by the existing labs and spaces currently used by the Computer Science department such as the computer labs in Rekhi 112, 112A, 113, and 117.

In addition, depending on the courses the students pursuing the concentration take, the students may also be expected to or allowed to access the Immersive Visualization Studio in the EERC 510, the virtual reality lab in Rekhi 314, and the Husky Game Development lab in Rekhi 219. Together, the equipment in these labs provide the computing infrastructure and hardware to develop video games and other software. Labs with virtual reality technology such as head-mounted displays will support students who are interested in writing next-generation games for this new, upcoming technology.

**15. Program costs:** Revise promotional/marketing material, including web material. Expected cost is less than \$1000 for year 1, with no additional funds in year 2 and 3.

**16. Space:** No additional space required

**17. Policies, regulations and rules:** No additional policies required

**18. Accreditation requirements:**

The Game Development concentration will fall within the ABET accreditation requirements for Computer Science. The CS department has started the accreditation process in the 2015-2016 academic year.

**19. Planned implementation date:** Fall 2016

## Appendix

The sections in this appendix are required by: <http://www.admin.mtu.edu/usenate/propose/04/51-04.htm>

## **1. Relation to University Strategic Plan**

### *1. Relation of program to the university's educational and research goals.*

The proposed concentration addresses Goal 2 and 3:

GOAL 2: A distinctive and rigorous action-based learning experience grounded in science, engineering, technology, sustainability, business, and an understanding of the social and cultural contexts of our contemporary world.

GOAL 3: Research, scholarship, entrepreneurship, innovation, and creative work that promotes a sustainable, just, and prosperous world.

The concentration is consistent with Goal 2 by providing many learning experiences grounded in science and technology.

The concentration is consistent with Goal 3 because it requires that students enroll in an enterprise course which encourages entrepreneurship, innovation, and creative work.

### *2. Consistency with the university's resource allocation criteria.*

This proposal does not require any significant new resources. The concentration will share resources with other CS concentrations.

## **2. Impact on University Enrollment**

### *1. Projected number of students in the program.*

40. This number is based on the fact that Husky Game Development Enterprise has had approximately 60 students enrolled in recent semesters. We know that many, but not all, of these students are interested in careers in game development. If approximately 1/3rd (i.e., 20) of these students switch to the new concentration and we attract around 20 new students to the program, the expected enrollment for this program would be 40.

### *2. Source of new students; in particular, will the students be drawn from existing programs, or will they be students who would otherwise not have come to MTU?*

Some students will be drawn from all CS-related degrees offered by the CS department. Since many prospective CS students express interest in game development and many are attracted to Husky Game Development, we also believe that this concentration will attract new students who might choose to go to a different school which offers a game development degree.

*3. What is the likely correlation between demand for the new program and existing enrollment patterns at MTU?*

Enrollment in Computer Science and software engineering is currently increasing and approaching 400. We expect similar patterns for the proposed concentration---any may even outpace the existing CS degrees.

*4. What is the current enrollment in the unit?*

398.

**3. Impact on Resources Required by Department in Which the Program is housed. This would include, but not be limited to:**

- 1. Faculty lines.*
- 2. Faculty and student labs, including ongoing maintenance.*
- 3. Advising.*
- 4. Assessment.*

We are not requesting any additional faculty lines for the creation of this degree concentration. If the proposed concentration results in significant growth of the number of CS students, then additional faculty lines and advising resources might be necessary---just as growth of any of the other CS concentrations would also require.

Assessment for the new degree concentration will be handled following the processes used for the existing CS degree and concentrations.

We are not requesting additional resources for faculty and student labs. The existing labs are sufficient for the proposed concentration and are used by undergraduate and graduate students across different CS-related degree programs. We predict that this will continue to be the case in the upcoming years. In the long term, large growth in enrollment in CS-related degrees or unexpected problems in labs might require additional resources.

**4. Impact on Resources Required By other Units Within the University. This analysis would include, but not necessarily be limited to, the impacts on:**

- 1. Other academic (e.g., Gen Ed) units with regard to faculty, labs and assessment. (NOTE: The current Student to Faculty ratio for the university as a whole is approximately 12:1 per Institutional Analysis.)*

The proposed concentration is similar to other CS concentrations. One significant change is that it currently requires students to take one course out of a list of FA and HU courses. Since students can pick one course from this list of seven courses, we expect that there will be a small impact on those departments.

- 2. Information Technology, the Library, central administration and career planning with respect to the impact on the need for computing services, library resources, advising, record keeping, development of employer relations etc.*

No significant impact.

**5. Assessment of the ability to obtain the necessary resources assuming requested funds are obtained**

*1. For high demand fields (e.g., business fields, etc.), will it be possible to fill allocated lines*

No significant new resources are needed for the proposed concentration.

**6. Past proposals. Has the department initiated any other new degree programs in the last five years? If so:**

*1. Describe the extent to which the new program has met the original goals with respect to: (1)*

*Enrollment, (2) Costs, (3) New faculty, and (4) Other resources required for the program*

*2. How have degree programs added in the past five years affected total enrollment in the department?*

The CS department has not initiated new undergraduate degree programs within the past five years. We have recently initiated a M.S. in Cybersecurity which is currently being reviewed by the University Senate. We also recently created a CS concentration in Computer Systems. However, it is too soon to provide an analysis of how successful these programs are at reaching the proposed goals. The Computer Systems concentration primarily drew students from the no longer offered Computer Systems Science degree.