

COMP 390: Broadening Participation in STEM (Computing, Math & Science)
(Section 01E)

Fall 2026 Course Information & Syllabus

Instructor: R. I. Greenberg

Mailing Address: Computer Science Department
Loyola University
Lake Shore Campus, Doyle Center Room 216
1052 W. Loyola Ave.
Chicago, Illinois 60626-0801

Office Hours: In Doyle Center Room 216 : Monday and Wednesday 1:00–2:30pm.

These are guaranteed times to find me except as announced in advance or at <http://bit.ly/RIGcal>. You should also feel free to look for me at other times or make appointments. Email any time is generally the best way to reach me.

Phone: (773)508-3782

Email: mailto:rig@cs.luc.edu

Home page: <https://rig.cs.luc.edu/~rig>

Departmental tutoring schedule: See <http://www.luc.edu/cs/resources/tutoring>.

Lectures: Online asynchronous in Sakai.

Lecture notes and handouts are generally available on the course web site. The handouts are numbered sequentially, starting with handout 1.

Course Objectives: Students will learn about the underrepresentation of various population groups in computing and STEM fields (science, technology, engineering, mathematics) as well as some of the reasons and negative effects of this situation. They will learn about techniques and educational materials for ameliorating this situation and will engage in relevant service learning activities.

Outcomes: Students gain first-hand experience with broadening STEM participation and seeing how they can make a difference in the lives of other students and contribute to national needs.

Prerequisites: None.

Textbook: None.

Course Requirements: Three credits may be completed all in one semester in accordance with the requirements below, or the work may be spread out over two semesters (generally envisioned as Fall and Spring of the same academic year).

Students will log at least 25 hours of service with community and school organizations geared towards broadening participation in computing or other STEM fields.

Students may suggest their own activities and bring in their own contacts as well as hearing about the instructor's suggestions and contacts. Students may also benefit from contacting staff of the Center for Experiential Learning (<http://luc.edu/experiential>) for STEM-related service ideas. The service hours may be all at one organization or at several related organizations (for example, different Chicago high schools). Students may work individually or in groups (typically small ones of two or three students). Though the final contacts may not be known in advance, each activity must involve a connection with an “onsite supervisor”, for example, a classroom teacher or organization staff member who can be contacted for a brief evaluation of the student(s) onsite performance. Students must submit names and contact information for onsite supervisors as soon as they are known.

After every service activity, students must make a very brief blog entry with brief information and observations relating to the activity. We will use the Blog area within Sakai. Blog entries may also productively describe the process of making arrangements and preparations for visits. In particular, students should do some advance research before visiting an organization (e.g., client demographics, knowledge level, community environment, etc.) and report such information.

Each student must submit a log of service hours by the last day of classes; it will also be checked at mid-term. A form that can be used for the log is included in Appendix A.

Students also must turn in four written essays, generally of about 500 words, and a longer final reflection at the dates noted in the course schedule. The first essay is to include initial written reflection on goals, motivations, and connections to past personal experience and interests; ideally it should also include a short description (subject to instructor approval) of planned activities and ideas for contacts and implementation. The remaining essays will provide written reflection on service activities and other learning to date, ideally incorporating linkages between the two. The final essay should be a somewhat more extensive summation. More detail about reflections (including the specific prompts) can be found in Appendix B.

Grade Distribution

Participation (class discussions & blog)	19%
Four Written Essays	32%
Final Written Essay	12%
Execution of Service Activities (based on quality and timeliness of plan, log, and site evaluations)	37%

Core Approval:

This is an Engaged Learning course, approved for the service-learning category, and thus satisfies the Loyola University Chicago Engaged Learning requirement.

University Policies: Note the policies regarding

- Academic Integrity: Open the third foldout at <https://catalog.luc.edu/academic-standards-regulations/undergraduate>
- Observation of Religious Holidays: <https://www.luc.edu/academicaffairs/stories/archive/honoringstudentreligiousobservances.shtml>
- Accessibility Support: See the “Student Support” section at https://www.luc.edu/media/lucedu/online/officeofonlinelearning/00L%20Syllabus%20Update_v5.docx
- Title IX: <https://www.luc.edu/equity/otherresources/resourcesforfacultystaff/syllabuslanguage>

Tentative Course Outline and Approximate Schedule:

(Note the University's academic calendar at <http://www.luc.edu/academics/schedules>.)

Initial focus will be on practical resources for exciting students about computing and other STEM fields so students can get started with their own activities. During the semester, we will gradually fill in pieces of a more theoretical or background nature that will enrich the students' service performance. Students will be expected to report on their own experiences throughout the semester. What follows here is computing-heavy, but information on other STEM fields will be introduced according to student interest.

Following is a tentative schedule of (1) the main topic coverage, which will be by session number, available at dates TBD pushed towards the early part of the term, and (2) milestones to be met with dates. Remember that you will also have other obligations throughout the semester of doing your service activities and submitting public blog entries about them; there will also be a space in Sakai for internal discussion.

- Principal presentation material

(1) Administrivia. Overview of course plan and requirements. Planning for connecting with school or community groups.

(2) Demo of Scratch as a possible teaching activity (<http://scratch.mit.edu>). And for your thinking about activities generally, a few points from: [29].

(3) Sample presentation on opportunities in computing [27], and followup with additional pieces that can be swapped in and out depending on time, audience, etc.

(4) AppInventor.

(5) Benefits of diversity [42, 43, 44].

(6) Effects of stereotype threat and strategies for lessening it [5, 4, 56, 57, 60, 61, 30, 6, 23].

(7) Background regarding strength of opportunities in computing and STEM and underrepresentation of certain groups e.g., [41, 55, 50, 9] and especially <https://datavisualization.cra.org/TaulbeeReports/2025/bachelors.html> in [9] for B.S. demographics.

(8) Research on some of the reasons behind underrepresentation of some groups, and how STEM fields can become more appealing, e.g., [54, 18, 37, 14, 11, 16, 52, 28, 12, 13, 10, 58, 53, 36, 24, 26, 38, 25, 33, 51]. Overview of organizations and additional resources for those working to broaden participation in computing/STEM and for enriching connections of students and teachers we work with, e.g., [40, 39, 15, 20, 7, 1, 8, 3].

(9) Ways to be more sensitive to and accommodating of cultural differences [49, 32, 31, 59], general pieces of [47, 2, 21, 22, 19, 48].

(10) Designing and teaching for accessibility <http://teachaccess.org>

(11) Perhaps some resources specific to STEM fields other than Computer Science, e.g., Mathematics has been of interest to some students.

(12) Perhaps more overview of learning through serving, leadership, and community building [17, 34, 35, 45, 46].

- Milestone dates by latest week/date of the semester to turn them in. Additional points to remember:

- Blogging is to accompany each service activity (within two days of the actual activity).
- The schedule below assumes one service site, but you can have more than one. For any additional site, you must complete the additional Service Learning Agreement form and Locus Engaged Learning Record before submitting any service hours for that site.

	3 credits	2 credits in 1st semester	1 credit in 1st semester
Job, Internship, and Service Fair or Non-Profit Oppurtunites Fair may be helpful for some people to find placements.	Usually in second week of Fall and Spring semesters, respectively		
Comment on class discussion forum about service you are contemplating; share leads for others if applicable.	Week 3 (9/11)	Week 3 (9/11)	Week 6 (10/2)
Turn in first reflection; hopefully have concrete service plans at this point, but can still write more general things in the first reflection.	Week 4 (9/18)	Week 5 (9/25)	Week 7 (10/9)
Comment again on class discussion forum about progress setting up service; share leads for others if applicable.	Week 5 (9/25)	Week 6 (10/2)	Week 8 (10/16)
Submit Service Learning Agreement (with site supervisor signature), and complete LOCUS engaged learning record.	Week 5 (9/25)	Week 7 (10/9)	Week 10 (10/30)
Turn in second written reflection.	Week 7 (10/9)	Week 9 (10/23)	Week 12 (11/13)
Turn in midterm service log of initial hours, at least 6 divided among at least 2 sessions.	Week 8 (10/16)	Week 10 (10/30)	Week 14 (11/27)
Briefly comment on class discussion forum about your progress in your service activities.	Week 9 (10/23)	Week 10 (10/30)	Week 14 (11/27)
Turn in third written reflection.	Week 9 (10/23)	Week 11 (11/6)	3rd week of 2nd semester
Turn in fourth written reflection.	Week 11 (11/6)	Week 13 (11/20)	6th week of 2nd semester
Turn in second service log of at least 14 hours divided among at least 4 sessions.	Week 11 (11/6)	last week of classes	8th week of 2nd semester
Comment on class discussion forum to briefly summarize the biggest thing you will want to discuss in your final written reflection.	Week 12 (11/13)	three weeks before 2nd semester classes end	three weeks before 2nd semester classes end
Turn in final written reflection. (An earlier date may apply to qualify for an Engagement Key.)	Week 14 (11/27)	one week before 2nd semester classes end	one week before 2nd semester classes end
Turn in final service log of at least 25 hours.	last week of classes	last week 2nd semester	last week 2nd semester

References

- [1] ACM's Committee on Women in Computing. ACM-W. <http://women.acm.org>.
- [2] Margaret M. Andrews and Joyceen S. Boyle. *Trancultural concepts in Nursing care*. Wolters Kluwer Health, 5th edition, 2008.
- [3] Anita Borg Institute for Women and Technology. Systers. <http://www.systers.org>.
- [4] Joshua Aronson. The threat of stereotype. *Educational Leadership*, 62(3):14–19, 2004. Available at <http://www.ode.state.or.us/initiatives/closinggap/2005/threatstereo-edldrshp112004.pdf>.
- [5] Joshua Aronson. Stereotype threat and the role of encouragement. Slides from keynote talk at NCWIT Summit available at http://www.ncwit.org/sites/default/files/ncwit2011summit_aronsonslides.pdf, May 2011.

- [6] Joshua Aronson, Carrie B. Fried, and Catherine Good. Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology*, 38(2):113–125, 2002. Available at <http://www.atkinson.yorku.ca/~jsteele/files/04082317412924405.pdf>.
- [7] Association for Computing Machinery. Computing degrees & careers. <http://computingcareers.acm.org>.
- [8] Association for Women in Computing. Association for women in computing (awc). <http://www.awc-hq.org/index.html>.
- [9] Jasmine Batten. CRA update: New CRA Taulbee survey findings show record degree production alongside a cooling enrollment pipeline. *Computing Research News*, 38(6), June 2026, <https://cra.org/crn/2026/06/cra-update-new-cra-aulbee-survey-findings-show-record-degree-production-alongside-a-cooling-enrollment-pipeline>. Accessed 8/11/2026.
- [10] BEST — Building Engineering and Science Talent, San Diego, CA. A bridge for all: Higher education design principles to broaden participation in science, technology, engineering and mathematics. http://www.bestworkforce.org/PDFdocs/BEST_BridgeforAll_HighEdFINAL.pdf, February 2004.
- [11] Carol J. Burger, Elizabeth G. Creamer, and Peggy S. Meszaros, editors. *Reconfiguring the Firewall: Recruiting Women to Information Technology across Cultures and Continents*. A K Peters, Ltd., 2007.
- [12] Kevin Carey. Choosing to improve: Voices from colleges and universities with better graduation rates. The Education Trust, Washington, DC. http://www2.edtrust.org/NR/rdonlyres/80202D18-D1DF-4897-9360-F33C16DF88F3/0/Choosing_to_improve.pdf, January 2005.
- [13] Kevin Carey. One step from the finish line: Higher college graduation rates are within our reach. The Education Trust, Washington, DC. http://www2.edtrust.org/NR/rdonlyres/10D6E141-08E4-42D7-B7E5-773A281BCDB7/0/onestep_.pdf, January 2005.
- [14] J. McGrath Cohoon and William Aspray, editors. *Women and Information Technology: Research on Underrepresentation*. MIT Press, 2006.
- [15] Computer science teachers association. <http://www.csta.acm.org>.
- [16] Joel Cooper and Kimberlee D. Weaver. *Gender and Computers: Understanding the Digital Divide*. Lawrence Erlbaum Associates, 2003.
- [17] Christine M. Cress, Peter J. Collier, Vicki L. Reitenauer, and Associates. *Learning through Serving: A Student Guidebook for Service-Learning Across the Disciplines*. Stylus Publishing, 2005.
- [18] Janice Cuny and William Aspray. Recruitment and retention of women graduate students in computer science and engineering. http://www.cra.org/Activities/craw/projects/best_practices.php, 2000. Report of a workshop organized by the Computer Research Association.
- [19] Linda Dayer-Berenson. *Cultural Competencies for Nurses: Impact on Health and Illness*. Jones and Bartlett Publishers, 2011.
- [20] WGBH Educational Foundation. dot diva. <http://dotdiva.org>.
- [21] Geri-Ann Galanti. *Caring for Patients from Different Cultures*. University of Pennsylvania Press, fourth edition, 2008.
- [22] Joyce Newman Giger and Ruth Elaine Davidhizar. *Transcultural Nursing: Assessment & Intervention*. Mosby, fourth edition, 2004.
- [23] Catherine Good, Joshua Aronson, and Michael Inzlicht. Improving adolescents. standardized test performance: An intervention to reduce the effects of stereotype threat. *Applied Developmental Psychology*, 24:645–662, 2003. Available at http://www.nber.org/~sewp/events/2005.01.14/Bios%2BLinks/Good-rec1-Good_Aronson_%26_Inzlicht.pdf.
- [24] Joanna Goode. If you build teachers, will students come? The role of teachers in broadening computer science learning for urban youth. *Journal of Educational Computing Research*, 36(1):65–88, 2007.

- [25] Joanna Goode. Increasing diversity in K–12 computer science: Strategies from the field. In *Proceedings of the 39th SIGCSE Technical Symposium on Computer Science Education*, pages 362–66, March 2008.
- [26] Joanna Goode and Jane Margolis. What is computer science anyway? Deepening urban teachers’ understandings of computer science and working towards an engaging pedagogy. In Caroline Crawford et al., editors, *Proceedings of the Society for Information Technology and Teacher Education International Conference*, pages 814–819, 2004.
- [27] Ronald I. Greenberg. Opportunities in computing. <http://www.illinoiscomputes.org/hspresent>.
- [28] Debra Humphreys and Abigail Davenport. What really matters in college: How students view and value liberal education. *Liberal Education*, 91(3/4):36–43, Summer/Fall 2005, http://www.aacu.org/liberaleducation/le-sufa05/LEAP_SUFA05.pdf.
- [29] Idealist.org and Stephanie Land. *The Idealist.org Handbook to Building a Better World: How to Turn Your Good Intentions into Actions that Make a Difference*, chapter 4: All Experience is Relevant, pages 56–74. Perigree Trade, 2009.
- [30] Michael Johns, Toni Schmader, and Andy Martens. Knowing is half the battle: Teaching stereotype threat as a means of improving women’s math performance. *Psychological Science*, 16(3):175–179, March 2005. Available at <http://clint.sharedwing.net/2print/knowing.pdf>.
- [31] Allan G. Johnson. *Privilege, Power, and Difference*. McGraw-Hill, 2nd edition, 2006. Chapter 3 “The Trouble We’re In: Privilege, Power, and Difference” available at <http://www.steorme.com/ftp/JohnsonTheTroubleWereIn.pdf>.
- [32] Allan G. Johnson. Who me? <http://www.agjohnson.us/essays/whome>, 2010. From [31].
- [33] Grace Kao. Group images and possible selves among adolescents: Linking stereotypes to expectations by race and ethnicity. *Sociological Forum*, 15(3):407–430, 2000.
- [34] James M. Kouzes and Barry Z. Posner. The five practices of exemplary student leadership. http://media.wiley.com/product_data/excerpt/72/07879816/0787981672.pdf, 2006.
- [35] James M. Kouzes and Barry Z. Posner. *The Student Leadership Challenge: Five Practices for Exemplary Leaders*. Jossey-Bass, 2008.
- [36] Jane Margolis, Rachel Estrella, Joanna Goode, Jennifer Jellison Holme, and Kimberly Nao. *Stuck in the Shallow End: Education, Race, and Computing*. MIT Press, updated edition, 2017.
- [37] Jane Margolis and Allan Fisher. *Unlocking the Clubhouse: Women in Computing*. MIT Press, 2002.
- [38] Jane Margolis, Jennifer Jellison Holme, Rachel Estrella, Joanna Goode, Kim Nao, and Simeon Strumme. The computer science pipeline in urban high schools: Access to what? for whom? *IEEE Technology and Society Magazine*, 22(3):12–19, Fall 2003.
- [39] Mentornet. <http://www.mentornet.net>.
- [40] National Center for Women & Information Technology. <http://www.ncwit.org>.
- [41] An Nguyen and Stanislava Ilic-Godfrey. New BLS employment projections: 3 charts. <https://beta.dol.gov/news-events/blog/new-bls-employment-projections-3-charts-0>, 6 September 2024. Accessed 8/12/2026.
- [42] Scott E. Page. *The Difference: How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies*. Princeton University Press, 2007.
- [43] Scott E. Page. Scott page on leveraging diversity. YouTube video uploaded Feb 9, 2010 of talk at Darden School of Business (U. of VA) available at <http://www.youtube.com/watch?v=lt9UeknKwZw>, 2010.
- [44] Scott E. Page. Leveraging diversity. Slides from keynote talk at NCWIT Summit available at http://ncwit.org/pdf/NCWITSummit_ScottPageSlides.pdf, May 2011.

- [45] Sharon Daloz Parks. *Common Fire: Leading Lives of Commitment in a Complex World*. Beacon Press, 1997.
- [46] Sharon Daloz Parks. *Leadership Can Be Taught: A Bold Approach for a Complex World*. Harvard Business Press, 2005.
- [47] Larry D. Purnell and Betty J. Paulanka. *Transcultural Health Care: A Culturally Competent Approach*. F. A. Davis Company, 1998.
- [48] Bashir Qureshi. *Transcultural medicine : Dealing with patients from different cultures : 35 articles published in the British medical press, 1981-1987*. Kluwer, 1989.
- [49] Vicki L. Reitenauer, Christine M. Cress, and Janet Bennett. Creating cultural connections: Navigating difference, investigating power, unpacking privilege. In *Learning Through Serving: A Student Guidebook for Service-Learning Across the Disciplines*, chapter 5, pages 67–79. Stylus Publishing, 2005.
- [50] U.S. News & World Report. 100 best jobs. <https://careers.usnews.com/best-jobs/rankings/the-100-best-jobs>. Accessed 8/11/2026.
- [51] Jean J. Ryoo and Jane Margolis. *Power On!* MIT Press, 2022.
- [52] Peter Schmidt. Study blames obstacles, not lack of interest, for shortage of black and hispanic scientists. *Chronicle of Higher Education Daily News*, 4 April 2006, <http://chronicle.com/daily/2006/04/2006040401n.htm>.
- [53] Anna L. W. Sears. Image problems deplete the number of women in academic applicant pools. *Journal of Women and Minorities in Science and Engineering*, 9(2):40–54, 2003.
- [54] Elaine Seymour and Nancy M. Hewitt. *Talking About Leaving: Why Undergraduates Leave the Sciences*. Westview Press, 1997.
- [55] Susannah Snider. The best jobs in america in 2026. *U.S. News & World Report*, January13 2026.
- [56] Claude M. Steele and Joshua Aronson. Stereotype threat and the intellectual test performance of african americans. *Journal of Personality and Social Psychology*, 69(5):797–811, 1995. Available at <http://www.psy.ucsd.edu/~dhuber/Steele%20and%20Aronson.pdf>.
- [57] Steve Stroessner and Catherine Good. Stereotype threat: An overview. http://diversity.arizona.edu/sites/diversity/files/stereotype_threat_overview.pdf, 2017. Reprinted and adapted with permission by R. Rhys from <http://reducingstereotypethreat.org>. Retrieved February 26, 2017.
- [58] Mary Thom. *Balancing the Equation: Where are Women and Girls in Science, Engineering, and Technology*. National Council for Research on Women, 2001.
- [59] David C. Thomas and Kerr Inkson. *Cultural Intelligence: Living and Working Globally*. Berrett-Koehler, second edition, 2009.
- [60] Gregory M. Walton and Geoffrey L. Cohen. A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology*, 92(1):82–96, 2007. Available at <http://www-new.stanford.edu/dept/psychology/cgi-bin/drupal/system/files/QuestionOfBelonging-1.pdf>.
- [61] Katherine Woolf, I Chris McManus, Deborah Gill, and Jane Dacre. The effect of a brief social intervention on the examination results of UK medical students: a cluster randomised controlled trial. *BMC Medical Education*, 9(35), 2009. Available at <http://www.biomedcentral.com/content/pdf/1472-6920-9-35.pdf>.

Appendices

A Service-Learning Log Sheet

Name _____

Date	Start/End Times	Work Completed	Supervisor Signature

B Reflections

B.1 General Notes

At intervals noted in the course schedule, it is expected that you will write a reflection on your experiences and learning. Research indicates that as students reflect on their service experiences, this process helps make their experiences more meaningful. Below are the sorts of components expected in personal reflections on your activities; there will also be some reflections more focused on expressing your thoughts and feelings about course “lecture” material. In any case, there will be more specific prompts as each reflection is assigned.

Description (What?): What happened in your experience? Describe your experience at community sites.

Analysis (So What?): What does this experience mean? What does it tell you about the organization? Issues in the Community? Analyze your experience.

Critical Reflection (Now What?): What impact does your role have at the sites visited? What impact in the community? What else needs to be done regarding the organization or issue?

As you reflect on your service experiences, please feel free to let the following questions guide your reflection:

1. Describe your service experiences.
2. What did you notice that was new, different, or unique about your experiences?
3. Did you have any experiences with individuals that shed light on the community issues? Explain.
4. What questions do you have regarding these experiences?
5. Characterize how visited institutions were organized. Provide assessments and explain your comments.
6. Did your experiences impact your understanding of the community issues addressed by partner organizations? How?
7. Do your experiences inform your understanding about living in this community and being an engaged citizen? Do your experiences inform your understanding of the Mission of Loyola University?

B.2 Specific Reflection Prompts

Following are the specific prompts anticipated for the written reflections throughout this term; note that the initial two reflections can be done *before* you have started doing service activities:

1. Write a reflection about your interests and motivation in connection with this class. You can write about what kinds of service particularly interest you, why you are interested in doing service to broaden participation in STEM/computing, why you are interested in specific types of service, etc. To the extent that you can, give specific details about your planned service activities for the class this semester. Submit about a page of text (spaced normally, not double, which generally comes to about 500 words).
2. Write a reflection (about one page single-spaced) about one or more topics discussed in course lessons so far, for example stereotype threat or diversity. Cite specific content from the lesson materials.
3. Write approximately one page single-spaced about your service experiences so far, and hopefully draw some connections to topics and content in the course lessons that we have gone through.
4. Write a reflection (about one page single-spaced) about one or more topics discussed in course lessons so far and beyond what you discussed in Reflection 2. Topics have included diversity, stereotype threat, opportunities / underrepresentation, remedies / resources, transcultural sensitivity, accessibility, and some information for those interested in STEM subjects other than computing. Cite specific content from the lesson materials.

5. (final reflection): Submit about three double-spaced pages containing about 750 words. Loyola University Chicago's Mission Statement: "We are Chicago's Jesuit Catholic university — a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice, and faith." Referencing Loyola's mission statement above, compose a written reflection that connects your in-class and out-of-class experience responding to the following:

- How did you connect your in-class (Sakai lesson content) and out-of-class (service activities) Engaged Learning experiences?
- How did your Engaged Learning experience help you connect to the University's mission?
- How did the Engaged Learning experience in this course affect your personal, intellectual, civic, and/or professional development?