



STEM Robotics 101 & CTE STEM Robotics 101 Professional Development

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STEM Robotics 101

Professional Development Program

The STEM Robotic 101 PD Program is designed to train and equip existing elementary, middle and high school teachers to become their school's CS/STEM teacher. **No prior experience in CS, STEM or Robotics is required.**

Features of the STEM Robotics 101 Professional Development Program include:

- The two-day hands-on professional development (computers, software and robots supplied) with an experienced instructor
- OSPI-certified STEM Clock Hours for Professional Development (Intro = 12 hrs; Advanced = 6 hrs)
- Free OSPI-approved model framework, leadership equivalencies and standards alignment
- Free take-home EV3 kit/software (~\$450 value - requires participation in classroom-based evaluation)
- A free turn-key, customizable curriculum repository
- A one-time 5% discount off the best internet volume pricing on a classroom set of LEGO® MINDSTORMS® EV3 kits
- Eligibility for STEM Robotics 101 Lesson Bounty Program, with a teacher-stipend for adding new lessons to STEM Robotics 101
- Eligibility for Advanced Topics Professional Development, including Advanced LEGO® Programming, Robo-Math, Robo-Science, Data Logging, Technology-demystification lessons, Java Programming on LEGO® MINDSTORMS® EV3 and FLL Primers.

Please review our [Frequently Asked Questions page](#) for more program details and the link to sign up for the STEM Robotics 101 PD program.

Frequently Asked Questions

What is the STEM Robotics 101 Curriculum?

[STEM Robotics 101](#) (Robo101) is a free CS/STEM curriculum for new Robotics teachers developed by the Olympia School District (OSD) and deployed worldwide with the help of two National Science Foundation Projects to 3,300+ registered teacher-users. Robo101 enables teachers to customize an approachable CS/STEM curriculum that plays to their unique strengths, while also meeting the individual needs of their students and goals of their school administrators.

This introductory STEM Robotics master curriculum uses the [LEGO® MINDSTORMS® EV3 Education Core Set](#) and [EV3 Education Edition Programming Software](#) to teach a full STEM Robotics course. STEM Robotics 101 was featured at the NCCE conference in Seattle, and this [Interview](#) with the NCCE Blog team provides insight into the history and goals of Robo101. A Home Edition of the EV3 Programming Software is available for [free download here](#).

The curriculum is divided into Units, several of which contain Lessons built around the [Introduction to Programming LEGO® MINDSTORMS® EV3](#) curriculum from Carnegie Mellon University's Robotics Academy. A substantial preview of this product is now available [free online from CMU's Robotics Academy](#) website. These self-paced learning-to-program videos are supplemented with lessons on robotics technologies, explicit math and science concepts, and the Engineering Process, to round out a complete STEM curriculum. This curriculum is supplemented by

the [Introduction to Programming LEGO® MINDSTORMS® EV3 Teacher's Guide](#) (EV3 Trainer Teacher's Guide). This is the [link](#) to purchase this Carnegie Mellon EV3 product.

[Scope & Sequence](#): Course-at-a-Glance & Customization Guide - a colored-coded Scope & Sequence which provides a Course-at-a-Glance view of STEM Robotics 101 EV3. The Legend at the bottom of the file also provides a guide to customizing the course contents to a unique combination students/teacher/school needs.

Where and When will the STEM Robotics 101 PD be held?

We will be hosting STEM Robotics 101 Intro PD workshops at all 9 ESDs and FIRST WA Fieldhouse in Kent. The current schedule of the 2-day [Robo101 Introductory Workshops is available here](#).

What is the Computer Science Education iGrant STEM Robotics 101 Professional Development Program?

The Computer Science Education iGrant provided funding to launch the STEM Robotics 101 Professional Development Program during the spring of 2016. Twenty-two two-day Robo101 Introductory PD session were held at 9 sites statewide, as well as several one-day Advanced Topics/Coaching sessions for Introductory PD graduates. FIRST Washington is excited to begin the next phase of our PD program in partnerships with ESDs around the state.

In the two-day Introductory workshop teachers learn how to build and program the LEGO® MINDSTORMS® EV3 robot and utilize/customize the rich set of Robo101 resources. While teachers will work in pairs (just like their students) with the provided kits and computers during the PD, each teacher will leave the Introductory PD equipped with their own take-home EV3 kit, software and the curriculum resources they need to customize a STEM Robotics course to meet the needs of their students and goals of their administrators.

The one-day Advanced Topics PD includes Advanced LEGO Programming, Robo-Math, Robo-Science, Data Logging, Technology-demystification lessons, Java Programming on LEGO® MINDSTORMS® and FLL Primers.

PD Participants will also learn about the STEM Robotics 101 Lesson Bounty Program. Teachers around Washington continually innovate in their classrooms, but this creativity too often remains isolated. The Robo101 Lesson Bounty program seeks to harvest this creative work by providing a stipend for Washington CS/STEM teachers to take the time to document and share complete new lessons for STEM Robotics 101 which they have created for their own class.

Is the STEM Robotics 101 Professional Development eligible for STEM Clock Hours?

Yes. The STEM Robotics 101 Professional Development Program was the first PD program in Washington certified as "STEM Clock Hours" for teacher certification purposes. Participants attending the STEM Robotics 101 Introductory PD two-day workshop will earn 12 STEM clock hours, administrated through ESD 112.

Are there OSPI-approved model frameworks and CTE Leadership Equivalencies for STEM Robotics 101?

Yes, the OSPI-approved model frameworks and CTE Leadership Equivalencies are available in the Classroom Resource [section](#) of the STEM Robotics 101 EV3 site.

How about standards alignments for non-CTE classes?

For non-CTE classes, the middle/high school standards (including Common Core Math/ELA, NGSS and the new WA CS standards) are provided on a unit-by-unit basis in the above model frameworks.

Also, the **FIRST®** LEGO® League organizers have published these standards alignments for FLL for 4th, 5th and 6-8th grades [here](#).

Note: these alignments are for the FLL competition only, STEM Robotics 101 may be used to cover many additional standards in the classroom.

What is the cost to participate in the Introductory STEM Robotics 101 PD program?

The registration fee for the 2-day STEM Robotics 101 Introductory PD is \$495, however partial scholarships are available for teachers impacting high under-represented student populations. Demographic information is requested during registration to determine a school's Tier for Robo101. Tier 1 teachers pay a net \$150 registration and Tier 2 teachers \$300 (See Financial Support FAQ below).

The registration fee includes:

1. The two-day hands-on professional development (computers, software and robots supplied) with an experienced instructor
2. OSPI-certified STEM Clock Hours (for certification purposes)
3. Free take-home EV3 kit/software (~\$450 value - requires participation in classroom-based evaluation)
4. Free OSPI-approved model framework/leadership equivalency and standards alignment
5. A free turn-key, customizable curriculum repository
6. A one-time 5% discount off the best internet volume pricing on a classroom set of LEGO MINDSTORMS EV3 kits and accessories
7. Eligibility for STEM Robotics 101 Lesson Bounty Program, with a teacher-stipend for adding new lessons to STEM Robotics 101
8. Eligibility for Advanced Topics Professional Development, including Advanced LEGO Programming, Robo-Math, Robo-Science, Data Logging, Technology-demystification lessons, Java Programming on LEGO MINDSTORMS EV3 and FLL Primers.

What financial support will be provided to teachers from schools with high under-represented student populations and how are these tiers determined.

The Computer Science Education Grant program was designed to “introduce and engage students from historically underrepresented groups, including girls, low-income students, and minority students, to computer science and to inspire them to enter computer science careers”.

To this end, the STEM Robotics 101 PD program will prioritize participation and financial assistance into three tiers to serve this objective:

Tier 1: Available to teachers who teach students from the most under-represented CS/STEM populations:

- 1) Teachers of Mandatory STEM Robotics 101 Enrichment Classes (100% participation of girls)
- 2) Teachers from Alternative Learning Experience Classes
- 3) Teachers from Special Education Classes
- 4) Teachers from schools in the highest quartile statewide (as determined by OSPI's 2016/17 Washington State Report Card) for:
 - a. Free or Reduced-Price Meals population rate (>60%)
 - b. Transitional/Bilingual population rate (>15%)
 - c. Non-White/non-Asian population rate (>50%)

Teachers from Tier 1 will be given highest priority for PD training slots and a \$345 registration scholarship, reducing the 2-day STEM Robotics 101 Intro PD fee to \$150.

Tier 2: Available to teachers who teach students from high under-represented CS/STEM populations:

Teachers from schools in the second-highest quartile statewide (as determined by [OSPI's 2016/17 Washington State Report Card](#)) for:

- 1) Free or Reduced-Price Meals population rate (>45%)
- 2) Transitional/Bilingual population rate (>10%)
- 3) Non-White/non-Asian population rate (>33%)

Teachers from Tier 2 will be given second-highest priority for PD training slots and a \$195 registration scholarship, reducing the 2-day STEM Robotics 101 Intro PD fee to \$300.

Tier 3: All other public/private school teachers.

Teachers from Tier 3 will be given priority for PD training slots on a first-come-first-served basis after Tier 1 and Tier 2 teachers are allocated slots. Tier 3 teachers will be given no additional financial assistance, but they will receive all the benefits listed in the previous FAQ.

How do I sign up for the STEM Robotics 101 PD Program?

Interested applicants should complete this [form](#) as soon as possible.

Please be sure to complete the optional section at the end of the form if you are interested in qualifying for Tier 1 or Tier 2 scholarships.

After review, applications will be prioritized as described in the previous FAQ and applicants/principals will be notified of their status, any available tiered scholarships and how to complete the final registrations (including payment of fee). A Letter of Support from the Principal will be required as part of this final registration process.

What are the start-up costs of a STEM Robotics 101 classroom?

The start-up costs on a per-seat basis for a STEM Robotics 101 classroom about \$225/seat.

This cost estimate assumes:

- 1) Two students per robotics kit (ideal ratio)
- 2) Classroom has access to “usable” computers (Mac, PC or iPads/Chromebooks, less than 6 years old)
- 3) Classroom licenses for programming and tutorial software
- 4) Classroom challenge supplies
- 5) Teacher has completed STEM Robotics 101 Introductory PD and is eligible for one-time start-up discounts (5% on kits/software from LEGO Education(R)).

Is help with start-up costs available?

FIRST Washington is beginning to work on a program to help support Tier 1 and Tier 2 Free or Reduced-Price Meals schools with their classroom start-up costs. If start-up costs are a barrier for your participation as a Tier1 or Tier 2 school, please contact **Erin McCallum** - erin@firstwa.org - at **FIRST**® Washington Robotics at for the emerging details.

What feedback have participants in the STEM Robotics 101 PD Program Provided?

Over two-thirds of the STEM Robotics 101 PD participants have taken the time provide written feedback on the workshop. Their complete, unedited and unfiltered feedback is available here: [STEM Robotics 101 Professional Development Participant Feedback](#).

Who do I contact if I have more questions about the STEM Robotics 101 PD program?

Please contact **Terri Campbell** at **FIRST®** Washington at terric@firstwa.org

Who will be the instructor for the STEM Robotics 101 PD?

Randy Steele of R&D Consulting (R_Dconsulting@comcast.net) will be the instructor for the STEM Robotics 101 Introductory PD. Randy has been a STEM Education Consultant and the CTE STEM Coach for the Olympia School District since 2010. He is the primary author and curator of the STEM Robotics 101 curriculum site.

Randy entered STEM education as an “empty-nest” career following two decades as a computer chip designer and engineering manager at Intel and ST Microelectronics. He has coached/mentored several teams for FLL, FTC and FRC competitions and has trained hundreds of Washington teachers on STEM Robotics 101.

Randy has a B.A.Sc. in Electrical Engineering with a minor in Management Sciences, a Washington State Residency Certificate in middle and high school math, and a Washington State CTE Certificate in STEM Technology, Computer Technology, Electronics and Engineering. Randy is also the inventor on 30 U.S. patents in the field of computer chip design.

CTE STEM Robotics 101 Professional Development

What is the CTE STEM Robotics 101 Professional Development program?

The STEM Robotics 101 Professional Development Program launched during the spring of 2016. Over 250 teachers participated in twenty-two 2-day Robo101 Introductory PD workshops held at 10 sites statewide, as well as several 1-day follow-up Advanced Topics/Coaching sessions for Introductory PD graduates. FIRST Washington is excited to begin offering the CTE-specific version of this PD which will include reviewing the OSPI-approved model CTE Framework and model Leadership Equivalency for FIRST and career-oriented resources for both middle and high schools.

In the two-day Introductory workshop, teachers learn how to build and program the LEGO® MINDSTORMS® EV3 robot and utilize/customize the rich set of Robo101 resources. Teachers will work in pairs (just like their students) with the provided kits and computers and leave the PD equipped with the curriculum resources they need to customize a STEM Robotics course to meet the needs of their students and goals of their administrators.

The one-day Advanced Topics PD includes Advanced LEGO Programming, Robo-Math, Robo-Science, Data Logging, Technology-demystification lessons, Java Programming on LEGO® MINDSTORMS® and FLL Primers.

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When and Where Will the CTE STEM Robotics 101 PD be Held?

The CTE STEM Robotics 101 Professional Development workshops will be held at all nine ESDs and the FIRST Washington Fieldhouse in Kent as demand warrants. The current schedule of 2-day CTE Robo101 Introductory workshops is available [here](#).

Are there OSPI-approved CTE Middle/High School Model Frameworks and Leadership Equivalencies for STEM Robotics 101?

Yes, the OSPI-approved model CTE Frameworks and model CTE Leadership Equivalencies are available in the Classroom Resource section of the STEM Robotics 101 EV3 site:

Middle School: <http://stemrobotics.cs.pdx.edu/node/2840?root=2643>

High School: <http://stemrobotics.cs.pdx.edu/node/2841?root=2643>

These frameworks have a one-to-one alignment with the STEM Robotics 101 curriculum and may be “pruned” by any district to create their own version reflecting how the course will be implemented locally.

What is the cost to participate in the Introductory STEM Robotics 101 PD program?

The registration fee for the 2-day CTE STEM Robotics 101 Introductory PD is \$295.

The registration fee includes:

1. The two-day hands-on professional development (computers, software and robots supplied) with an experienced instructor
2. OSPI-certified STEM Clock Hours (for certification purposes)

3. Free OSPI-approved model framework/leadership equivalency and standards alignment
4. A free turn-key, customizable curriculum repository
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Randy entered STEM education as an “empty-nest” career following two decades as a computer chip designer and engineering manager at Intel and ST Microelectronics. He has coached/mentored several teams for FLL, FTC and FRC competitions and has taken multiple teams to the FIRST World Championships.

Randy has a B.A.Sc. in Electrical Engineering with a minor in Management Sciences, a Washington State Residency Certificate in middle and high school math, and a Washington State CTE Certificate in STEM Technology, Computer Technology, Electronics and Engineering. Randy is also the inventor on 30 U.S. patents in the field of computer chip design.