

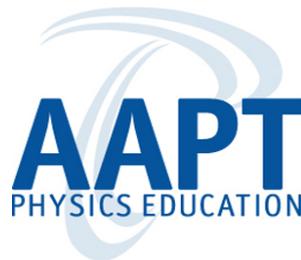
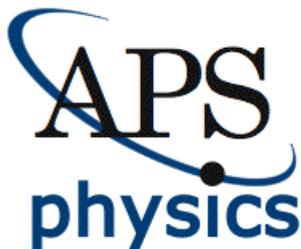
**Workshop 307:**  
**Thriving Physics Departments:**  
**Effective Practices, Tools, and Tips**

*Michael Jackson*

*Millersville University of Pennsylvania*

*Toni Sauncy*

*Texas Lutheran University*



## The EP3 Guide

# Background Information

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## Effective Practices for Physics Programs: The EP3 Guide

**APS, in collaboration with AAPT, is creating a guide to help physics departments improve, review and assess their programs ... and to help them meet challenges they may face**

The EP3 Project is bringing together research and information about practices for building successful and effective physics programs from experts across the American physics community.

**Co-Chair:** David Craig, Le Moyne College & Oregon State University

**Co-Chair:** Michael Jackson, Millersville University of Pennsylvania

- Noah Finkelstein, University of Colorado Boulder
- Courtney Lannert, Smith College and UMass Amherst
- Ramon Lopez, University of Texas at Arlington
- Willie Rockward, Morgan State University
- Gay Stewart, West Virginia University
- Gubbi Sudhakaran, University of Wisconsin-La Crosse
- Kathryn Svinarich, Kettering University
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**Editorial Director:** Sam McKagan

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**AAPT Liaison:** Bob Hilborn

**Task Force Support:** Kathryn Woodle

**External Reviewer:** Stephanie Chasteen

[ep3guide.org](http://ep3guide.org)

## Who is it for?

- Physics department chairs
- Program leaders
- Programs undergoing a self-study and being reviewed
- Program reviewers
- Departments & faculty facing program challenges or interested in improving their programs
- Anyone in physics involved with student learning assessment
- Administrative leaders

## Help department chairs (& other program leaders)

- Bring together known literature on topics
- Collect practices recognized by the community as effective when there is insufficient evidence-based literature
- Collect information for departments to use in advocating for resources to improve their program
- Encourage discussions in departments on continuous improvement of physics programs using evidence
- External program assessment / departmental review
- Improve usefulness of assessment
- Engage PER community on departmental needs

## Chapters:

- **Introduction:** how to navigate and use the guide
- How to be an **Effective Chair**
- **How to create and sustain effective changes in your department or program**
- **Effective Practices** (~25 “sections”)
- **Assessment of Student Learning:** developing a useful and efficient culture of assessment
- **Program Review and a Departmental Culture of Continuous Self-Improvement:** Preparing for a self-study and program review as well as a Guide to reviewers
- **Ancillary material:** Creating foundational documents; examples of student learning goals and program learning goals; assessment instruments; additional resources

## Students

- *Recruiting (under review)*
- *Retention (synthesis)*
- *Advising and Mentoring of Students*
- *Internships*
- *Undergraduate research*
- *Career preparation (reviews complete)*

## Curriculum

- *Implementing research-based instructional practices in your program (overarching)*
- *Introductory courses for physical science and engineering majors*
- *Introductory courses for life sciences majors*
- *Upper-level physics courses*
- *Introductory courses for Non-STEM majors*
- *Communication skills*
- *Laboratory / experimental skills*

- *Computational skills*
- *Culminating integrative experiences (Capstone experiences)*
- *Online education (receiving contributions)*

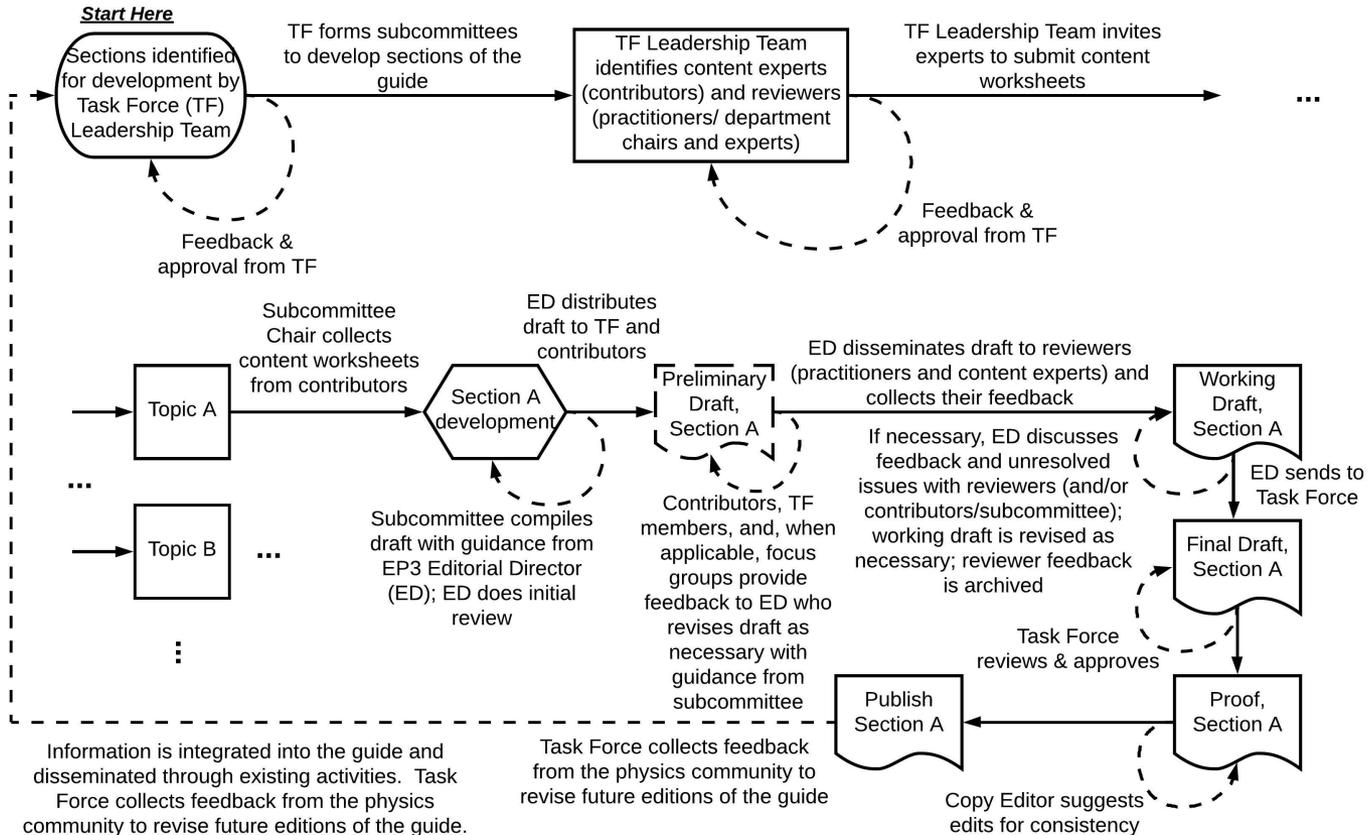
## Programs

- *Individuated degree tracks: engineering / applied physics*
- *Institutional partnerships: dual-degree physics / engineering programs*
- ***High school physics teacher preparation***
- ***Undergraduate Instructional Assistants***
- *Community engagement / outreach*

## Departmental

- *Physical environment: encouraging collaboration and learning*
- ***Departmental climate***
- ***Equity, diversity, and inclusion***
- *Ethics*

## Task Force Approval Process for the EP3 Guide



Note: In approx. 2021, the EP3 Editorial Board, that will report to the APS COE, will replace the Task Force and assume responsibility for facilitating updates to the guide. The process, that will include individuals from both APS and AAPT, is currently being developed.

(8)

(8)

(3)

(2)

(1)

To date: approx. 80 contributors submitted materials with another approx. 15 pending



For each section there will be several individuals (including yourself) contributing content

The task force and editorial director will then synthesize into one cohesive document.

We may have some additional questions for you. After internal vetting you will have a chance to see and comment on the synthesized section.

Each section will be sent for expert review to at least 4 individuals.

To see an example of a final section the Teacher Preparation can be found here: <http://apps3.aps.org/bpupp/>

*“The end result is a guide that is very substantially better than anything I could have produced by myself.”*

*“After reading through the document multiple times, this reviewer is convinced that this is a very solid, thoughtful, practical, yet visionary work that will be usable by diverse physics departments.”*

*“It is a lot, but I like the fact that there are so many practical suggestions.”*

**What information would you look for in the EP3 Guide?**

**What questions would you try to answer using the EP3 Guide?**

<http://apps3.aps.org/bpupp/>

## High School Physics Teacher Preparation

### Description

Physics programs are encouraged to implement, document, publicize, and support pathways to recruit and educate future high school teachers. This includes creating an environment within the program that promotes high school teaching as a valid and desirable career option for students.

#### ⊕ Benefits to the Program

### Effective Practices

#### 1. Implement a teacher preparation pathway

##### ⊕ Establish a degree track for high school teacher education within the major

1. In programs with one track, modify the existing degree to allow certification requirements
2. In programs with multiple tracks, design a teaching track to allow students to smoothly transition among degree options (should be perceived as on par with other career options)
3. Collaborate with School of Education or its equivalent to accurately communicate required components for licensure (curriculum, field experiences, testing, etc.) to students
4. Design the program (individually or with other science departments) in collaboration with the College of Education to meet licensure requirements
5. Learn from existing models, e.g., PhysTEC and UTeach employ practices and strategies for recruiting, preparing, and supporting teachers that begin within the physics program
6. Be mindful not to add extra expense or time to graduation

##### ⊕ Understand alternate pathways to teacher certification

##### ⊕ Support recent graduates during their transition into the classroom

## Example from the draft section on Career Preparation

2. Provide students with on-campus experiences that explicitly teach skills and knowledge relevant to future careers
  - a. Develop ~~skills and knowledge program~~ learning goals aligned with your department's mission that are relevant to future careers
    - i. Review ~~the skills and knowledge~~ learning goals included in the Phys21 report-chapter 4.
    - ii. ~~Establish learning goals that include input from alumni, local employers, and those developed by other universities or colleges.~~
  - b. Provide flexible degree plan options for students that align with their career goals
    - i. Establish career-relevant tracks or suggested concentrations (groups of elective courses or course substitutions) within the major (see **Individuated Degree Tracks** section).
    - ii. Include options and support for students choosing to pursue a career in secondary education (see [High School Physics Teacher Preparation](#) section).
    - iii. ~~Establish, r~~ Review and revise the student's degree plan on a regular schedule to ensure that they are aligned with their career path.
  - c. Create new or modify existing physics courses that align with career preparation program learning goals

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## The AIP Career Pathways Project

- Is:**
- Collection of community knowledge and evidence-based practices
  - Authored, reviewed, approved by physics community (>200!)
  - *Living* document (not static), with stewardship by an Editorial Board
  - Primarily online
  - Ethics and diversity included throughout
  - Effort to encourage evidence-based pedagogy
  - Transform mandatory assessment into useful exercise
  - Suggestions on how to improve all aspects of a program
  - Opportunity to extend reach of education research

## Is:

- **Key:** flexible, not prescriptive; mindful of local contexts
- **Tool to help departments understand who they are and what they want to be, and then provide community-based knowledge and information to help them achieve this**

## Is NOT:

- Accreditation or program certification
- Mandate to conform
- A checklist of required actions
- Every possible idea for what to do (e.g., the 'kitchen sink')
- At the smallest level of detail to assist with implementation
- **Finished (yet)**

- i. Disseminate the physics community knowledge and expertise contained in the EP3 Guide
- ii. Encourage and support adoption of the effective practices
- iii. Encourage and support development of a departmental culture of continuous self-reflection and improvement
- iv. Support departments in achieving specific goals and objectives by employing the knowledge, practices, and underlying philosophy of the EP3 Guide

## Planned Initiatives:

- i. Conference panels and presentations
- ii. Workshops at APS, AAPT and other conferences
- iii. Workshops at specialized meetings (e.g., Department Chairs Meeting)
- iv. EP3 Online Communities

**How many have led the development of their department's self-study?**

**How many have served as a program reviewer for another physics department?**

**Could you see using the guide to assist with a program review (either in the development of a self-study or in serving as a program reviewer)?**

**For those who served as a program reviewer, what type of training was available to you prior to conducting the program review?**

## Co-chairs:

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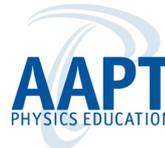
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**Research Team:** Chandra Turpen, Joel Corbo



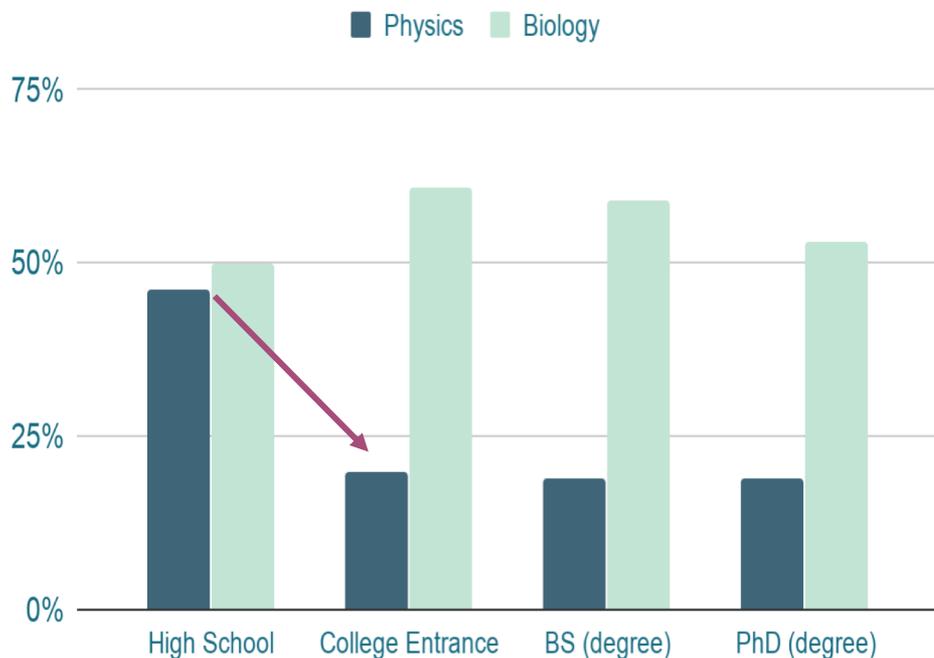
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Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

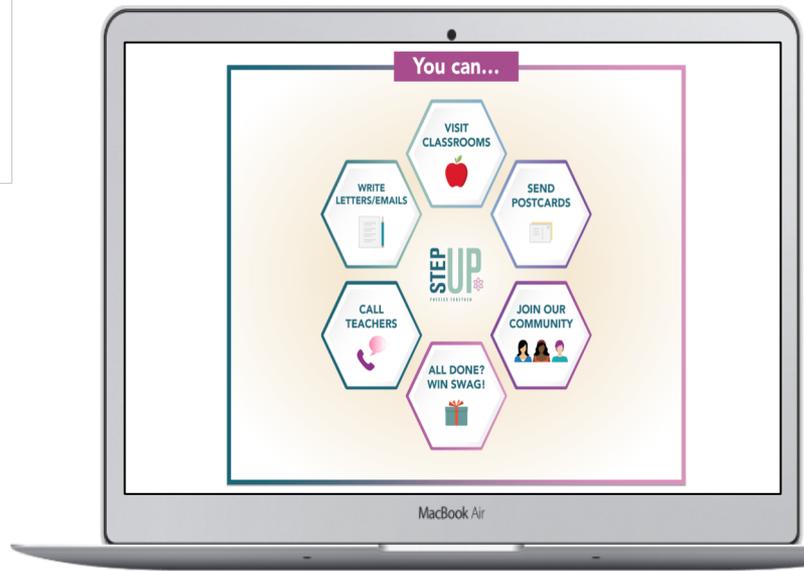
Most women in physics choose their career path in high school



Percentage of students who are women at various academic stages

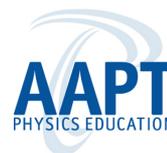


— this is where we must act.



## What can you do?

1. **Register:** [STEPUPphysics.org](http://STEPUPphysics.org)
2. **Approach local teachers:** Use our outreach dashboard
3. **Discuss:** Brainstorm new ideas with others



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