

# Fundamentals of Particle Accelerators

U.S. Particle Accelerator School

Old Dominion University, Winter 2018

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Course Syllabus – 2018 January 15-26

| <b>Wk 1</b> |                                   |  |                                   | 14:00 - 14:50                       |                  |
|-------------|-----------------------------------|--|-----------------------------------|-------------------------------------|------------------|
| <i>Day</i>  | 9:00 - 9:50                       | 10:00 - 10:50                            | 11:00 - 11:50                     | 15:15 - 16:45                       | >19:00           |
| Mon         | Introduction & Prerequisites      | Accelerators & Particle Beams            | Steering & Focusing               | Accelerator Components<br>LAB Intro | <i>LAB/Study</i> |
| Tues        | Transverse Motion                 | Phase Space Distributions                | Courant-Snyder Parameterization   | Lab/Study Session                   | <i>LAB/Study</i> |
| Wed         | Accelerating Structures           | Longitudinal Focusing                    | Transverse Effects and Dispersion | Lab/Study Session                   | <i>LAB/Study</i> |
| Thu         | Motion through Periodic Systems   | Repetitive Systems: Transverse Stability | Repetitive Systems: Acceleration  | Lab/Study Session                   | <i>LAB/Study</i> |
| Fri         | Collection of Beam Optics Modules | Longitudinal Manipulations               | A synchrotron and a Linac         | Lab/Study                           |                  |

| <b>Wk 2</b> |                                     |                                      |                                      | 14:00 - 16:45                  | >19:00           |
|-------------|-------------------------------------|--------------------------------------|--------------------------------------|--------------------------------|------------------|
| <i>Day</i>  | 9:00 - 9:50                         | 10:00 - 10:50                        | 11:00 - 11:50                        |                                |                  |
| Mon         | Linear Errors & Adjustments - I     | Linear Errors & Adjustments - II     | Nonlinear Motion and Resonances      | Lab/Study Session              | <i>LAB/Study</i> |
| Tues        | Synchrotron Radiation               | Storage Ring Light Sources           | X-Ray Free Electron Lasers           | Lab/Study Session              | <i>LAB/Study</i> |
| Wed         | Emittance Dilution                  | Intro to Intensity Dependent Effects | Beam Instrumentation and Diagnostics | Lab/Study Session              | <i>LAB/Study</i> |
| Thu         | Overview of an Accelerator Facility | *****<br>Spare Topic<br>*****        | Outlook for the Accelerator Field    | <b>Review</b><br>(13:00-13:50) | <i>LAB/Study</i> |
|             |                                     |                                      |                                      | Finish Labs                    |                  |
| Fri         | <b>Final Exam (9:30 a.m.)</b>       |                                      |                                      |                                |                  |