# Short Course on PVS

## OCTOBER 9-12, 2012

**Presented by:**

NASA Langley Research Center
*and* National Institute of Aerospace

**Location:**

National Institute of Aerospace
100 Exploration Way
Hampton, VA 23666

**Overview:**

The Formal Methods teams at NASA Langley Research Center and the National Institute of Aerospace are offering a short course on the formal specification and verification system PVS *(http://pvs.csl.sri.com)*. The class will take place October 9 - 12, 2012 at the National Institute of Aerospace (NIA) in Hampton, Virginia. The course will be offered free of charge as a public service to the formal methods community. However, attendees bear the cost of travel and lodging. The class is open to all interested individuals, including non-US citizens.

We emphasize a hands-on, immersion-style learning approach. Both lecture material and in-class exercises using PVS are featured. For this reason, we strongly encourage attendees to bring a laptop. Over four days, we will introduce specification writing and interactive theorem proving, as well as some NASA/NIA-specific examples.

**Instructors:**

| | | | |
|---|---|---|---|
| Rick Butler | NASA | Ben Di Vito | NASA |
| Alwyn Goodloe | NASA | Heber Herencia | NIA |
| Jeff Maddalon | NASA | César Muñoz | NASA |
| Anthony Narkawicz | NASA | Sam Owre | SRI International |

**Organizers:**

César Muñoz
*cesar.a.munoz@nasa.gov*
*http://shemesh.larc.nasa.gov/people/cam*

Anthony Narkawicz
*anthony.narkawicz@nasa.gov*
*http://shemesh.larc.nasa.gov/people/ajn*

**REGISTRATION AND INFORMATION**

*http://shemesh.larc.nasa.gov/PVSClass2012/*

# Tentative Course Syllabus

## ◆ DAY 1: TUESDAY

| Time | | Event | Instructor |
|---|---|---|---|
| 8:30 | 8:50 | Meet and Greet | |
| 8:50 | 9:20 | Introduction to Formal Methods | Rick Butler |
| 9:20 | 9:50 | PVS in a Hurry | Anthony Narkawicz |
| 9:50 | 10:00 | Break | |
| 10:00 | 10:50 | Types and Declarations | Ben Di Vito |
| 10:50 | 11:00 | Break | |
| 11:00 | 12:00 | Exercise Set 1 | |
| 12:00 | 1:00 | Lunch | |
| 1:00 | 1:50 | Expression Language | Ben Di Vito |
| 1:50 | 2:00 | Break | |
| 2:00 | 3:00 | Exercise Set 2 | |
| 3:00 | 3:50 | Propositional Logic Proving | Ben Di Vito |
| 3:50 | 4:00 | Break | |
| 4:00 | 5:00 | Exercise Set 3 | |

## ◆ DAY 2: WEDNESDAY

| Time | | Event | Instructor |
|---|---|---|---|
| 8:30 | 9:20 | Higher Order Logic Proving | Anthony Narkawicz |
| 9:20 | 9:30 | Break | |
| 9:30 | 10:30 | Exercise Set 4 | |
| 10:30 | 11:20 | Prelude and NASA Libraries | Rick Butler |
| 11:20 | 11:30 | Break | |
| 11:30 | 12:00 | Exercise Set 5 | |
| 12:00 | 1:00 | Lunch | |
| 1:00 | 1:50 | Real Number Proving | César Muñoz |
| 1:50 | 2:00 | Break | |
| 2:00 | 3:00 | Exercise Set 6 | |
| 3:00 | 3:50 | Collection Types | Jeff Maddalon |
| 3:50 | 4:00 | Break | |
| 4:00 | 5:00 | Exercise Set 7 | |

## ◆ DAY 3: THURSDAY

| Time | | Event | Instructor |
|---|---|---|---|
| 8:30 | 9:20 | Abstract Datatypes | Alwyn Goodloe |
| 9:20 | 9:30 | Break | |
| 9:30 | 10:30 | Exercise Set 8 | |
| 10:30 | 11:20 | Induction and Recursion | César Muñoz |
| 11:20 | 11:30 | Break | |
| 11:30 | 12:00 | Exercise Set 9 | |
| 12:00 | 1:00 | Lunch | |
| 1:00 | 1:50 | Advanced Type Features | Jeff Maddalon |
| 1:50 | 2:00 | Break | |
| 2:00 | 2:30 | Rapid Prototyping | César Muñoz |
| 2:30 | 3:00 | Computational Reflection | Anthony Narkawicz |
| 3:00 | 3:10 | Break | |
| 3:10 | 4:10 | Exercise Set 10 | |
| 4:10 | 5:00 | Analysis, Vectors, and Linear Algebra | Heber Herencia |

## ◆ DAY 4: FRIDAY

| Time | | Event | Instructor |
|---|---|---|---|
| 8:30 | 9:20 | Proof Scripting and Strategy Writing | César Muñoz |
| 9:20 | 9:30 | Break | |
| 9:30 | 10:00 | Exercise Set 11 | |
| 10:00 | 10:30 | Nonlinear Arithmetic Proving | Anthony Narkawicz |
| 10:30 | 11:00 | Exercise Set 12 | |
| 11:00 | 11:10 | Break | |
| 11:10 | 12:00 | Theory Interpretations | Sam Owre |
| 12:00 | 1:00 | Lunch | |
| 1:00 | 1:50 | Invited Talk | Sam Owre |
| 1:50 | 2:00 | Break | |
| 2:00 | 2:50 | Survival Tips and Conclusion | Rick Butler |