



Athabasca University 

SCHOOL OF COMPUTING & INFORMATION SYSTEMS

# Adaptive, Intelligent and Analytics Systems

**Dr. Sabine Graf**  
Associate Professor

<http://sgraf.athabascau.ca>  
[sabineg@athabascau.ca](mailto:sabineg@athabascau.ca)

## Research Team:

Muhammad Anwar (PhD student)  
Cecilia Ávila (PhD student)  
Silvia Margarita Baldiris Navarro (Postdoc)  
Kirstie Ballance (RA)  
Charles Jason Bernard (MSc student)  
Edward da Cunha (MSc student)  
Gregory Gomez Blas (undergrad. Student)  
Daniel Hamacher (undergrad. student)  
Elinam Richmond Hini (MSc student & RA)  
Darin Hobbs (MSc student & RA)  
Zoran Jeremic (research programmer)  
Jeff Kurcz (MSc student and RA)  
Philippe Lachance (RA)  
Jesus Martinez Arvizu (undergrad. Student)  
Tamra Ross (RA)  
Rose Simons (MSc student)  
Richard Tortorella (PhD student)

# Adaptivity and Personalization in Learning Systems

How can we make learning systems more adaptive, intelligent and personalized



- In different settings such as desktop-based, mobile and ubiquitous settings
- Based on a rich student model that combines learner information and context information
- Supporting learners as well as teachers
- Using techniques from artificial intelligence, data mining, visualization, etc.
- Develop approaches, add-ons and mechanisms that extend existing learning systems

# Three Core Areas

1. Identifying information about learners and their learning context
2. Use this information in order to provide learners with adaptive courses, personalized recommendations and intelligent feedback
3. Analyse students' behaviour data and identify indicators for the quality of learning materials/course designs as well as for learner performance and the effective use of learning strategies

# Research Topics

- **Adaptivity based on learning styles**
  - Automatic identification of learning styles based on students' behaviour [Jason Bernard]
  - Dynamic identification and updating of learning styles [Muhammad Anwar]
  - Adaptive course provision based on learning styles [Collaboration with Leibniz University Hannover, Alberta Distance Learning Centre; Ting-Wen Chang, Jeff Kurcz]
  - Adaptive recommendations for teachers to make their courses better support students with different learning styles [Moushir El-Bishouty]

# Research Topics

- Adaptivity based on cognitive abilities [Ting-Wen Chang, Jeff Kurcz]
  - Automatic identification of cognitive abilities based on students' behaviour in an online course
  - Dynamic identification and updating of cognitive abilities
  - Providing teachers with recommendations about how to consider students' cognitive abilities
  - Adaptive course provision based on students' cognitive abilities

# Research Topics

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- Adaptivity based on motivation [Philippe Lachance, Edward Gama da Cunha, Jesus Martinez Arvizu, Gregory Gomez Blas]
  - Integrating techniques for motivating students in learning systems
  - Investigating effectiveness of motivational techniques for students with different characteristics, situations and contexts
  - Providing adaptive functionality for motivating students

# Research Topics

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- Adaptivity based on students' context
  - Identification of students' context through sensor technology [Richard Tortorella]
  - Identification of device functionalities and their usage [Renan Lima, Moushir El-Bishouty]
  - Providing adaptivity based on students' context [Richard Tortorella]

# Research Topics

- Combining adaptivity based on students' context with adaptivity based on students' characteristics
  - Providing adaptivity based on learning styles and context information for mobile devices [Richard Tortorella]
  - Combine students' characteristics, context and learning behaviour [Hazra Imran, Mohammad Belghis-Zadeh]
  - Providing adaptive recommendations based on pedagogical rules, student's history, and collaborative filtering [Hazra Imran, Mohammad Belghis-Zadeh]
  - Provide visualization of identified information



# Research Topics

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- Collaborative learning
  - Enhancing communication and project management in collaborative settings through adaptive recommendations  
[Jeff Kurcz, Ting-Wen Chang]

# Research Topics

## ■ Learning Analytics

- Identification of at-risk students
  - What features are relevant for at-risk student identification [Darin Hobbs, Júlia Marques Carvalho da Silva]
  - How to use such features for at-risk identification [Daniel Hamacher, Júlia Marques Carvalho da Silva]
  - Learning styles vs. course content support [Moushir El-Bishouty]
- Visualization of analytics/behaviour data [Hazra Imran, Kirstie Balance]

# Research Topics

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## ■ Academic Analytics

- Enhancing the Accessibility of Educational Log Data for Investigating Effective Course Design and Teaching Strategies  
[Harza Imran, Ting-Wen Chang, Jason Bernard, Tamra Ross]