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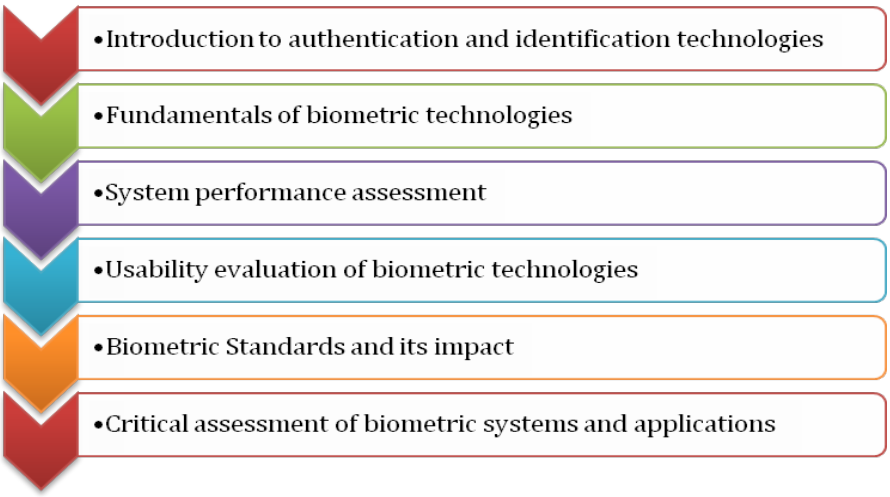
Course Name: IT545Y Biometric Technologies and Applications, 3 credit hours

Purdue University's Biometrics Standards, Performance, and Assurance Laboratory (BSPA) is offering its graduate level class on biometric technologies and applications in a distance education format. This educational program provides a private virtual classroom that provides a high level of flexibility to the participants. This course is designed for individuals who want to learn about biometric technologies and its applications. The course will last 16 weeks and will follow semester system at Purdue University. The module details are on Page 2. This course costs ***$927.90 + application fee***. More information regarding the cost can be here: https://www.continuinged.purdue.edu/distance/courses/

Course Objectives



Learning Outcomes

- To understand biometric terms
- To gain a broader knowledge of biometric technologies
- To understand differences among biometric technologies
- To design better biometric systems
- To critically evaluate biometric systems in real world applications
- Write and interpret biometric testing reports

Requirements for enrollment

To enroll for this course students have to register with the Graduate School at Purdue University as a non degree seeking student. Registration instructions can be found here: http://www.bspalabs.org/education

Contact Information

For more information on course material or registration requirements, please email contact@bspalabs.org.

BSPA LABS
BIOMETRIC STANDARDS, PERFORMANCE, AND ASSURANCE LABORATORY

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Weekly Module Details

The course is structured as a series of 16 modules with an associated lab activity and quiz. Listed below are the topics that will be covered in each module.

Module Name	Description	Lab Activity
1. Course Introduction / Introduction to Authentication Technologies	• Basics of authentication technologies • Differences between biometrics and traditional authentication • Impact of biometrics on information security • Biometric System Model	Case study analysis comparing different authentication technologies. Getting familiar with biometric tools used in the course
2. Biometric System Performance Terminology	• Performance assessment terminology • Testing methods used in biometrics • Acquisition errors and its calculation • Comparison errors and its calculation • Graphical analysis of system performance	Generation and analysis of EER curves, DET curves, CMC curves using a biometric dataset.
3. Fingerprint Recognition	• History • Anatomy and discussion of fingerprint features • Acquisition techniques :optical, capacitive, thermal, RF, piezoelectric • Feature extraction techniques : discussion of fingerprint features • Feature matching techniques • Impact of quality on performance • Discussion of challenges & applications of fingerprint recognition	Quality analysis of fingerprint images, and its impact on performance of fingerprint recognition.
4. Iris Recognition	• History • Anatomy and discussion of iris features • Acquisition techniques • Feature extraction techniques • Feature matching techniques • Overview of anti-spoofing • Discussion of challenges & applications of iris recognition	Understanding segmentation issues in iris images, and calculating error rates of iris matching system.
5. Face Recognition **Assignment of semester project**	• History • Anatomy and discussion of face features • Acquisition techniques: 2D & 3D • Feature extraction techniques : 2D & 3D • Feature matching techniques: 2D & 3D • Discussion of challenges & applications of face recognition	Quality analysis of face recognition images, and its impact on performance of face recognition systems.
6. Vein Pattern	• History	Calculating error rates of finger

Recognition	• Anatomy and discussion of face features • Acquisition techniques: transmissive and reflective • Feature extraction from different parts of the hand • Discussion of challenges & applications of vein pattern recognition	vein recognition under different hand conditions.
7. Hand Geometry	• History • Anatomy and discussion of hand features • Acquisition technique • Feature extraction of hand features • Discussion of challenges & applications of hand recognition	Case study analysis of a hand recognition deployment.
8. Voice Recognition	• History • Anatomy and discussion of voice features • Feature extraction from voice signals • Text dependent and Text independent methods • Discussion of challenges & applications of voice recognition	Understanding impact of different channels (landline, & cellphone) and microphones on error rates of voice recognition.
9. Signature Verification	• History • Discussion of signatures features • Acquisition techniques • Feature extraction from dynamic signatures • Discussion of challenges & applications of signature verification	Calculating consistency of signature verification features.
10. Keystroke Dynamics **11. Retina Recognition**	• History • Discussion of keystroke features • Acquisition techniques • Types of keystroke dynamics applications • Discussion of challenges & applications of keystroke dynamics • History • Anatomy and retina features • Acquisition techniques • Feature extraction • Discussion of challenges & applications of retina recognition	Calculating consistency of keystroke dynamics features.
12. Multi-biometric Systems	• Introduction to multi-biometric systems • Types of multi-biometric systems • Levels of fusion in multi-biometric systems • Discussion of challenges & applications of multi-biometric	Work on semester project

	systems	
13. Usability of Biometric Systems	• Introduction to human biometric sensor interaction • Evaluation of biometric systems from user's perspective • Impact of sensor design and human perception on performance	Work on semester project
14. Biometric Standards & System Integration	• Structure of biometric standards organizations • Importance of biometric standards • Discussion of biometric standards • Interoperability of data, systems, applications and its implications on large scale systems. • Requirements analysis of applications with respect to biometrics • Analysis of system vulnerabilities • Biometric data lifecycle • Biometric management policies • Privacy considerations	Analyze standards compliance of face images taken under different conditions. Examine impact of standards on accuracy.
15. Semester Project	• Work on semester project	
16. Final Exam	• Semester Project Presentation	

Course Material:

There is no required book for this course. The "Handbook of Biometrics", edited by A.K Jain, P. Flynn and A. Ross, is recommended as reference material.

Quizzes:

Each module will have a quiz. Students will be allowed to take the quiz once. The quiz will be administered through Blackboard (e-learning platform).

Lab Activities:

All lab activities will be performed by logging onto a dedicated machine in the biometrics lab. Students will be able to perform the lab activities from a remote location. Each lab activity will require writing a report documenting your methodology, analysis and results. The lab activities will be related to the lecture material. The lab reports will be due 1 week after the activity is started. All lab reports have to be submitted by the 15th week of the semester at the latest.

Semester Project:

There will be a semester project which will involve all components of the course. Information about the semester projects will be provided in the 5th week of the course. The deliverable of the project will be to submit a 15 page report and give a 15 minute presentation. This presentation will be conducted using a virtual meeting room. It is the

responsibility of the individual to schedule progress update meetings to ensure that deliverables of the project are met. The final semester project grade will comprise of the final report and final presentation.

Office Hours:

The instructor will coordinate two separate office hours each week of 2 hours each after consulting the schedules of students in the class. Students will also have the capability of emailing the instructor to ask questions and clarify any information.

Course Evaluation:

It is anticipated that the following scale will be used to determine the final grade in the course.

Grading Activity	Percentage
Semester Project	40%
Lecture Quizzes	20%
Lab Reports	20%
Final Exam (Cumulative)	20%
Total	100%

Grade Breakdown

Percentage	Final Grade
98 – 100	A+
93 – 97	A
90 – 92	A-
88 – 90	B+
83 – 87	B
80 – 82	B-
78 – 80	C+
73 – 77	C
70 – 72	C-
68 – 70	D+
63 – 67	D
60 – 62	D-
0 – 59	F

Exam Policy

There will be one final exam which will be administered through Blackboard. The exam will typically contain multiple choice, true-false, fill-in-the-blanks questions. The final is 120 minutes.

If you are unable to take an exam within the designated timeframe, then it is your responsibility to contact the instructor before the exam, so an alternative timeframe can be agreed upon.

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Lab Activities

Lab activities will be graded according to the completion of the specific activity and demonstration of knowledge associated with the lab activity.

It is the responsibility of the student to make sure items are graded and in Blackboard before the commencement of the final exam.