

|                           |   |
|---------------------------|---|
| <b>Course Code</b>        | CSE694F/ECE5xx  |
| <b>Course Name</b>        | Multimedia Security   |
| <b>Credits</b>            | 4   |
| <b>Course Offered to</b>  | UG/PG   |
| <b>Course Description</b> | Media Security course introduces the multimedia fundamentals and security related issues such as rights protection, authentication, traitor tracing, forensics, adversarial signal processing, covert communication and surveillance. Overview of different aspects of multimedia security and compression techniques, architectures and standards will be discussed. Some of the course topics are information hiding and its applications, media compression, robustness analysis, encryption, passive forensics, source identification, multimedia signatures and egocentric video forensics, adversarial signal processing, Discrete Fourier/Wavelet Transform, electrical network frequency estimation, visual surveillance, steganography and steganalysis. |

| <b>Pre-requisites</b>  |                           |  |
|--|---------------------------|--|
| Pre-requisite (Mandatory)                                      | Pre-requisite (Desirable) | Pre-requisite(other)                                 |
| CSE340/CSE540/ ECE350 Image Analysis/ Digital Image Processing |                           | ECE250 Signals and Systems<br>CSE344 Computer Vision |

None

\*Please insert more rows if required

| <b>Post Conditions*(For suggestions on verbs please refer the second sheet)</b>       |   |  |  |
|---|---|--|--|
| <b>CO1</b>  | <b>CO2</b>  | <b>CO3</b>   | <b>CO4</b>   |
| Students are able to understand and analyse the media representation and fundamentals | Students are able to apply and evaluate the media security techniques | Students are able to perform forensics and counter-forensics | Students are able to demonstrate an understanding of visual surveillance |

| <b>Weekly Lecture Plan</b> |  |                |                                     |
|----------------------------|--|----------------|-------------------------------------|
| <b>Week Number</b>         | <b>Lecture Topic</b>   | <b>COs Met</b> | <b>Assignment/Labs/Tutorial</b>     |
| 1                          | Introduction - Digital Media Systems, Media Security Techniques, Applications                                  | CO1            |                                     |
| 2                          | Watermark Classification – Spatial domain;<br>Detection of Watermark;<br>Error analysis;<br>Probability models | CO1,CO2        | Assignment - Analytical + Practical |

|     |   |              |                                     |
|-----|---|--------------|-------------------------------------|
| 3   | Basics of information theory;<br>Entropy coding;<br>Discrete Cosine Transform;<br>Image Compression - JPEG  | CO1,CO2      | Lab exercise                        |
| 4   | Video fundamentals;<br>Motion Estimation and compensation   | CO1, CO2,CO3 | Quiz 1                              |
| 5&6 | Review of Discrete Wavelet Transform;<br>Hiding in DWT domain<br>Human Visual system;<br>Adaptive watermarking;<br>Information hiding capacity;<br>Attacks on watermark | CO1, CO2,CO3 | Assignment - Analytical + Practical |
| 7   | Audio authentication – Electrical Network Frequency (ENF);<br>ENF estimation;<br>Forgery detection  | CO2,CO3      |                                     |
| 8   | Media Forensics – Camera identification;<br>Passive forgery detection.<br>Vehicle forensics   | CO2,CO3      | Quiz 2                              |
| 9   | Forensic Detectors<br>Adversarial Processing and Counter-forensics  | CO2,CO3      | Assignment - Analytical + Practical |
| 10  | Steganography/Steganalysis;<br>Review of popular algorithms   | CO2,CO3      | Quiz 3                              |

|       |  |     |                                     |
|-------|--|-----|-------------------------------------|
| 11&12 | Visual Surveillance<br>Person Reidentification | CO4 | Assignment - Analytical + Practical |
| 13    | Recent trends and challenges                   |     |                                     |

\*Please insert more rows if required

| Weekly Lab Plan |                     |         |                              |
|-----------------|---------------------|---------|------------------------------|
| Week Number     | Laboratory Exercise | COs Met | Platform (Hardware/Software) |
|                 |                     |         |                              |
|                 |                     |         |                              |
|                 |                     |         |                              |

\*Please insert more rows if required

| Assessment Plan    |                         |
|--------------------|-------------------------|
| Type of Evaluation | % Contribution in Grade |
| Quiz               | 20                      |
| Assignment         | 20                      |
| Mid-sem            | 15                      |
| End-sem            | 20                      |
| Project            | 25                      |

\*Please insert more row for other type of Evaluation

| Resource Material |   |
|-------------------|---|
| Type              | Title   |
| Textbook          | Digital Watermarking and Steganography by Ingemar J. Cox, 2nd Edition, Morgan Kauffman Publication. |
| Reference         | Watermark Systems Engineering, Mauro Barni, CRC Press, 2004.  |
|                   | JPEG2000 Standard for Image Compression, T. Acharya, Wiley, 2005.                                   |
|                   | K. Sayood, Introduction to Data Compression (3rd edition), Morgan Kaufmann, 2009.                   |
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