**Course Description**

| **Subject Code** | 20B12CS332 | **Semester: Odd** | **Semester** 5th **Session** 2022 -2023 Month from: Aug to Dec 2022 |
| --- | --- | --- | --- |
| **Subject Name** | Fundamentals of Computer Security | | |
| **Credits** | 3 | **Contact Hours** | 3-1-0 |

| **Faculty (Names)** | **Coordinator(s)** | Dr. Amanpreet Kaur(62), Dr. P. Raghu Vamsi(62), Shariq Murtuza(128) |
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| **Teacher(s) (Alphabetically)** | Dr. Amanpreet Kaur (62), Dr. P. Raghu Vamsi(62) , Shariq Murtuza(128) |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
| --- | --- | --- |
| C330-2.1 | Explain the fundamental concepts of computer security and malware types | Remember Level (C1) |
| C330-2.2 | Identify types of cryptographic techniques and working of classical cryptosystems | Understand Level (C2) |
| C330-2.3 | Describe authentication and access control paradigms | Understand Level (C2) |
| C330-2.4 | Apply proactive solutions to security like Firewalls and IDS | Apply Level (C3) |
| C330-2.5 | Describe legal and ethical issues with respect to information security | Understand Level (C2) |

| **Module No.** | **Subtitle of the Module** | **Topics in the Module** | **No. of Lectures for the module** |
| --- | --- | --- | --- |
| **1.** | Security Basics | General overview, terminology and definitions, Security models and policy issues | 6 |
| **2.** | Introduction to Malware | Introduction to Malicious code, Spyware, Ransomware, Logic Bombs, Virus, Bacteria and Worms, Introduction to Anti-malware technology | 6 |
| **3.** | [Threats to Network Communications](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06.html#ch06lev1sec3) and Basic Cryptography | [Threats to Network Communications](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06.html#ch06lev1sec3), [Interception: Eavesdropping and Wiretapping](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06.html#ch06lev2sec4), [Modification, Fabrication: Data Corruption](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06.html#ch06lev2sec5), [Interruption: Loss of Service](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06.html#ch06lev2sec6), [Port Scanning](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06.html#ch06lev2sec7), Introduction to cryptography and classical cryptosystem, Steganography vs Cryptography | 8 |
| **4.** | Authentication | [Identification Versus Authentication](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec1), [Authentication Based on Something You Know](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec2), [Something You Are](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec3), [Something You Have](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec4), [Federated Identity Management](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec5), [Multifactor Authentication](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec6), [Secure Authentication](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec7), Password policies | 5 |
| **5.** | Access Control | [Access Policies](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec8), [Implementing Access Control](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec9), [Procedure-Oriented Access Control](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec10), [Role-Based Access Control](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch02.html#ch02lev2sec11), Captchas | 5 |
| **6.** | Intrusion Detection and Response | [Goals for Intrusion Detection Systems](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec46), [Types of IDSs](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec42) – Anomaly Based and Signature Based ,[Intrusion Prevention Systems](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec44), [Intrusion Response](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec45) | 5 |
| **7.** | Firewalls | [What Is a Firewall?](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec34), [Design of Firewalls](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec35), [Types of Firewalls](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec36), [Personal Firewalls](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec37), [Comparison of Firewall Types](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec38), [Example Firewall Configurations](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec39)  [Network Address Translation (NAT)](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec40), [Data Loss Prevention](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch06a.html#ch06lev2sec41) | 3 |
| **8.** | Legal and Ethical Issues | [Protecting Programs and Data](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev1sec1) - [Copyrights](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev2sec1), [Patents](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev2sec2), [Trade Secrets](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev2sec3), [Information and the Law](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev1sec2) - [Information as an Object](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev2sec5), [Legal Issues Relating to Information](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev2sec6), [Protection for Computer Artifacts](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev2sec8),[Ethical Issues in Computer Security](https://learning.oreilly.com/library/view/security-in-computing/9780134085074/ch11.html#ch11lev1sec6) | 4 |
| **Total number of Lectures** | | | **42** |
| **Evaluation Criteria**  **Components Maximum Marks**  T1 20  T2 20  End Semester Examination 35  TA 25 (**Attendance- 10, Class Test/ Quiz-5, Mini Project (for PBL) -10)**  **Total 100**  **Project Based Learning:** Each student in a group of 2-4 will choose one of the computer security aspects such as malware defence, cryptographic applications, reverse engineering code, authentication implementation, intrusion detection system development, firewalls configuration etc. for development and analysis. Applying theseconceptswill enable the students in enhancing their understanding and skills towards computer system hardening. | | | |

| **Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format) | |
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|  | **Text Books:** |
| 1. | Security in Computing (5th edition), Pfleeger, Pfleeger and Margulies, Pearson. |
| 2. | Computer Security: Art and Science by Matt Bishop, Addison-Wesley Educational Publishers Inc |
|  | **Reference Books:** |
| 1. | Computer Security Fundamentals, (4th Edition), Chuck Easttum, Pearson Ed. |
| 2. | Foundations of Computer Security, David Salomon, Springer |
| 3. | Introduction to Modern Cryptography (2nd edition), Katz and Lindell, Chapman & Hall/CRC |
| 4. | Elements of Computer Security, David Salomon, Springer |
| 5. | Cryptography Theory and Practice (3rd edition), Stinson, Chapman & Hall/CRC |