

GEORGIA INSTITUTE OF TECHNOLOGY  
School of Electrical and Computer Engineering

ECE 6606  
Coding Theory

**Project: Reed Solomon Encoder/Decoder**

**Due: Monday, Dec. 4**

- In this project, your assignment will be to design and implement a narrow sense (31, 21) RS code (matlab or C code) and provide a written report by the due date. The code is on  $GF(32)$  using the primitive polynomial  $p(x) = x^5 + x^3 + 1$ .
- You may use matlab built in functions to implement Galois fields and addition and multiplication in the field. However, you are not supposed to use matlab built in functions to decode RS codes. You should specifically implement the decoding technique (Extended Euclid's Alg.) that we study in the class.
- I will email you at least one corrupted codeword of the form  $(r_0, r_1, \dots, r_{30})$  differing from a codeword by  $f_1$  erasures and  $t_1$  errors. If  $(2t_1 + f_1) \leq 10$ , your program should output the appropriate codeword.
- I will email you the received vector as integers in the range 0-30, 32, or  $f$ , where these integers correspond to the exponents on  $\alpha$ , except 32 which represents the field element zero, and  $f$  that is for the erasure. For example,

I will email you: 4 12 32  $f$  0 ...

which represents:  $\alpha^4 \alpha^{12} 0 \text{ erasure } \alpha^0 \dots$

Your written report should not exceed 2 pages of singly spaced one column text describing your encoder/decoder algorithm and the design (if your project pass the test, you do not need to submit any written report).

- Collaboration: Only independent work is allowed.
- What to submit: You will email me: 1. the original (corrupted) and corrected codeword, 2. your (matlab or C) program, 3. your report (if your design did not pass the test). No late project will be accepted.